

FIFTY-SEVENTH ANNUAL REPORT

OF THE

DEPARTMENT OF MARINE AND FISHERIES

FOR THE

FISCAL YEAR 1923-24

MARINE

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OTTAWA
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PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1924

*To General His Excellency the Right Honourable Lord Byng of Vimy, G.C.B.,
G.C.M.G., M.V.O., Governor General and Commander in Chief of the
Dominion of Canada.*

MAY IT PLEASE YOUR EXCELLENCY:

I have the honour to submit herewith, for the information of Your Excellency and the Parliament of Canada, the Fifty-seventh Annual Report of the Department of Marine and Fisheries, Marine Branch.

I have the honour to be,

Your Excellency's most obedient servant,

P. J. ARTHUR CARDIN,
Minister of Marine and Fisheries.

DEPARTMENT OF MARINE,
OTTAWA, 1924.



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REPORT

OF THE

DEPUTY MINISTER OF MARINE AND FISHERIES

To the Hon. P. J. ARTHUR CARDIN,
Minister of Marine and Fisheries.

SIR,—I have the honour to submit herewith my report for the fiscal year ended March 31, 1924.

During 1922 as pointed out in last year's report there was, with the single exception of Germany, a falling-off in the merchant shipping output of every maritime country as compared with its 1921 output, the decreases being most marked in the United States and Japan.

That this decline is continuing is shown by the following Lloyds figures: World merchant tonnage in hand on December 31, 1922, 2,954,318 tons; on March 31, 1923, 2,860,072 tons; and on June 30, 1923, 2,543,856 tons; it will be seen that in the course of six months there has been a drop of 410,462 tons in the amount of world merchant tonnage under construction, and in the three months from March 31, 1923, to June 30, 1923, a drop of 316,216 tons.

Despite this reduction in building and extensive laying up of ships during 1922, particularly in the United States and France, world merchant steam and motor tonnage (steel and wood) on June 30, 1923, exceeded the tonnage on June 30, 1922, by approximately 1,000,000 tons; the figures being 61,342,952 for 1922 and 62,335,373 for 1923 (Lloyds statement); this falls short by about 2,000,000 tons of the "Five per Cent" principle of increase usually applied to shipping in times of normal trade; in the present state of world trade and scarcity of cargoes it affords a slight alleviation for shipping trade congestion, but the excess of tonnage competing for cargoes is still a pronounced feature of the present shipping situation.

On June 30, 1922, 34 per cent of American tonnage, exclusive of Great Lakes tonnage, was laid up, 31 per cent of French tonnage, and 20 per cent of Italian tonnage. At the same time about 7 per cent of United Kingdom tonnage was out of commission.

Sweden, Japan and Norway, in the order named, were the countries least affected as they still are. A year later there was an improvement in this respect in the case of nearly every maritime country, as will be shown later on.

LLOYDS Comparison of Gross Tonnage Owned at June 1922, and June, 1923

Where Owned	1922			1923		
	Steamers and Motor Vessels	Sailing Vessels	Total	Steamers and Motor Vessels	Sailing Vessels	Total
	Gross tons	Gross tons	Gross tons	Gross tons	Gross tons	Gross tons
Great Britain and Ireland..	19,088,638	206,999	19,295,637	19,115,178	166,371	19,281,549
Other countries.....	42,254,314	2,820,835	45,075,149	43,220,195	2,664,494	45,884,689
Total.....	61,342,952	3,027,834	64,370,786	62,335,373	2,830,865	65,166,238

During the twelve months from June 30, 1922, to June 30, 1923, there was an increase of 992,421 gross tons in the world's steam tonnage, and a decrease in the sailing tonnage of 196,969 tons; giving a net world increase of 795,452 tons.

SAILING TONNAGE DECLINE

According to Lloyds the decrease in the world's sailing tonnage from June 30, 1914, to June 30, 1923, amounts to about 1,500,000 tons.

The present percentage of sailing tonnage in the world's total merchant marine tonnage is somewhat less than 4½. The United States possesses 1,260,000 tons of the world's total sailing tonnage, about 44½ per cent, France has at present 284,000 tons, Norway 176,000 tons, Great Britain and Ireland 166,000 tons, and Italy 153,000 tons.

Newfoundland affords a striking instance of the decline of the sailing ship. The *New York Journal of Commerce* of April 7, 1923, states that at present the Newfoundland merchant marine comprises only 70 foreign going ships all told; for upwards of the previous half century it never had less than 100.

The *Newfoundland Trade Review* attributes the passing of the Newfoundland type of fishing schooner in part to the high rates of insurance paid on the cargoes and hulls of sailing vessels, as compared with those paid on the cargoes and hulls of steamers; the discrepancy is very marked, and inflicts a severe handicap on the sailing ship in freight carrying competition; as a result the Newfoundland fishing schooners are now being largely replaced by foreign owned steam craft.

COMPARISON of Overseas Shipping Laid up at June 30, 1922, and June 30, 1923

Country	June 30, 1922	June 30, 1923
	Gross tons	Gross tons
United States.....	5,762,205	4,312,273
United Kingdom.....	1,667,000	1,063,653
France.....	1,200,000	661,382
Italy.....	585,336	355,109
Netherlands.....	330,000	229,500
Norway.....	112,000	117,000
Greece.....	100,000	116,000
Japan.....	79,000	35,800
Sweden.....	7,132	.....

The above table is taken from the report of the American Commissioner of Navigation to the Secretary of Commerce for the United States fiscal year ended June 30, 1923. The figures though approximate are fairly accurate.

It will be seen that in the course of twelve months the shipping situation in nearly every maritime country has improved materially, the only exceptions being in the cases of Norway and Greece, and also that the relative positions of the different maritime countries in the matter of shipping laid up are pretty much as they were a year ago.

Of the American 4,312,273 tons of overseas shipping laid up at June 30, 1923, 3,813,404 tons were under the United States Shipping Board Control, and 498,869 tons under private ownership.

10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000
10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000
10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000
10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000
10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000
10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000
10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000
10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000
10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000
10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000

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COMPARATIVE Table of Types of Vessels, 1914 and 1923

	1914	1923
	Per cent of total gross tonnage	Per cent of total gross tonnage
Sail power only...	8.06	4.34
Oil, etc., in internal combustion engines.....	0.45	2.56
Oil fuel for boilers.....	2.65	24.23
Coal.....	88.84	68.87
	100.00	100.00

The decline of the sailing ship and of the coal burning ship, the gradual increase of oil burning ships using internal combustion engines, and the marked increase of ships using fuel oil for boilers are shown in this Lloyds table.

PROPORTION OF NEW TONNAGE, 1923

In 1923, 57.3 per cent of United States overseas tonnage was less than five years old, 52.6 per cent of German tonnage, 37.8 per cent of Holland's tonnage, 36.8 per cent of Canada's tonnage, 35.3 per cent of Japan's tonnage, 34.7 per cent of France's tonnage, and 25.1 per cent of the tonnage of Great Britain and Ireland.

In 1923, 35 per cent of the entire world tonnage was under five years old.

By far the largest tonnage group is that comprising vessels of between 4,000 and 6,000 gross tons each. This group accounts for about 28 per cent of entire world tonnage. Liners of 15,000 tons and upwards comprise about 3 per cent of world tonnage.

MERCANTILE SHIPBUILDING IN 1923

These returns are from Lloyds Register Annual Summary, are in gross tons, and comprise only merchant ships of 100 gross tons or upwards.

TABLE showing the number and tonnage of merchant vessels launched in Great Britain and Ireland during 1923

District	1923							
	Steamers		Motor Vessels		Sail and Barges		Total	
	No.	Tons gross	No.	Tons gross	No.	Tons gross	No.	Tons gross
Aberdeen.....	6	4,231	.....	.....	.....	.....	6	4,231
Barrow, Maryport and Workington	2	2,986	.....	.....	.....	.....	2	2,986
Belfast.....	10	117,926	1	9,500	.....	.....	11	127,426
Bristol.....	2	949	1	2,578	.....	.....	3	3,527
Dublin.....	1	156	.....	.....	.....	.....	1	156
Dundee.....	3	13,254	2	8,028	.....	.....	5	21,282
Clyde {Glasgow.....	31	98,192	5	32,822	2	1,225	39	132,239
{Grennock.....	11	40,150	1	230	1	582	13	40,962
Hartlepoons.....	5	23,864	.....	.....	.....	.....	5	23,864
Hull.....	10	17,311	.....	.....	.....	.....	10	17,311
Leith.....	5	6,580	1	806	4	1,396	10	8,782
Liverpool.....	4	14,280	2	7,364	.....	.....	6	21,644
Londonderry.....	1	1,906	.....	.....	.....	.....	1	1,906
Middlesbro', Stockton and Whitby	21	35,709	2	7,000	.....	.....	23	42,709
Newcastle.....	40	124,515	3	12,615	1	278	44	137,408
Newport, Mon.....	.....	.....	.....	.....	.....	.....	.....	.....
Southampton.....	2	2,338	1	201	.....	.....	3	2,539
Sunderland.....	16	45,461	1	6,100	.....	.....	17	51,561
Other districts.....	9	3,415	.....	.....	14	1,703	23	5,118
Total.....	179	553,223	21	87,244	22	5,184	222	645,651

TABLE showing size of merchant vessels launched in Great Britain and Ireland during 1923

Tonnage		Steam	Motor	Sail and Barges
100 and under	500 tons.....	31	3	17
500	" 1,000 "	23	1	5
1,000	" 2,000 "	60	1	
2,000	" 3,000 "	13	1	
3,000	" 4,000 "	3	4	
4,000	" 5,000 "	9	3	
5,000	" 6,000 "	10	3	
6,000	" 8,000 "	17	4	
8,000	" 10,000 "	3	1	
10,000	" 12,000 "	4		
12,000	" 15,000 "	2		
15,000	" 20,000 "	1		
20,000 tons and above.....		3		
		179	21	22

TABLE showing the countries for which the Merchant Vessels launched in Great Britain and Ireland during 1923 have been built

Countries for which intended	Number	Gross Tonnage
Great Britain and Ireland.....	203	626,805
British Dominions.....	12	8,594
Egypt.....	1	806
France.....	2	1,809
Holland.....	1	3,117
Norway.....	1	4,000
Russia.....	1	300
Spain.....	1	220
Total.....	222	645,651

During 1923 there were launched in Great Britain and Ireland 222 merchant ships, with a total gross tonnage of 645,651 tons.

Of this tonnage 18,846 tons, or less than 3 per cent, was for foreign owners; twelve of the ships were built for the dominions and only seven all told for continental countries. In 1922 of Britain's total output, 26 per cent was for foreign owners; her 1923 foreign output thus shows a decline of about 23 per cent.

All the vessels built in 1923 were of steel, and not a single sailing vessel was launched during the year.

SIZE AND TYPE OF VESSELS

The 1923 returns show that thirty-eight vessels of between 5,000 and 10,000 tons each and ten vessels of 10,000 tons and upwards were launched. The following are the largest:—

Minnewaska.....	21,716 tons
Mooltan.....	20,847 "
Maloja.....	20,837 "
California.....	16,792 "
Ascania.....	13,911 "
Voltaire.....	13,248 "

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Excluding vessels of less than 1,000 tons, nine vessels of about 58,200 tons for the carriage of oil in bulk were launched during 1923. Of these, five vessels of about 30,500 tons were built on the Isherwood system of longitudinal framing.

The average tonnage of steamers and motor vessels launched during the year is lower than usual, viz: 3,805 tons, excluding vessels of less than 500 tons; in 1922 the average tonnage was 5,186, and in 1921 4,602.

VESSELS FITTED WITH TURBINES

Fitted with this method of propulsion and all of them with geared turbines, eleven vessels with a total tonnage of 121,075 tons were launched. It may be stated that of the vessels of 10,000 tons and upwards launched during the year, six are to be fitted with turbines.

VESSELS FITTED WITH INTERNAL COMBUSTION ENGINES

During the year, twenty-one motor vessels of 87,244 tons have been launched, and eight of them are of 5,000 tons and upwards, the largest being of about 9,500 tons. These figures include two vessels, of 3,682 tons each, with electric motive power, oil engines being employed to drive the generators which supply the power to the propelling motors.

OUTPUT OF LEADING SHIPBUILDING CENTRES

As usual the Clyde district occupies first place among the shipbuilding centres, with an output of 173,201 tons. Then follow the Tyne (137,408 tons), Belfast (127,426 tons), the Tees (66,573 tons), and the Wear (51,561 tons). As compared with the output for 1922 the Clyde shows a decrease of 218,867 tons, the Tyne of 103,380 tons, but Belfast shows an increase of 40,131 tons.

Germany

During 1923, 117 vessels of 358,273 tons were launched in German yards. These figures comprise eight vessels of 13,211 tons launched at Danzig.

These figures include seven vessels of 66,370 tons to be fitted with steam turbines, and, apart from vessels of less than 1,000 tons, eight vessels of 41,772 tons to be fitted with oil engines.

The totals comprise eighteen vessels of between 4,000 and 6,000 tons, twelve of between 6,000 and 10,000 tons, four vessels of between 10,000 and 13,325 tons, and the *Deutschland*, of 20,602 tons, building at Hamburg.

United States

The output for 1923 comprised eighty-three vessels of 172,817 tons. Of this tonnage 76,326 tons were launched on the Great Lakes, a marked increase over 1922 when only 21,977 tons were launched.

The total figures include eleven steamers of between 6,000 and 9,000 tons each, only two of which, with a tonnage of about 16,900 tons, have been built on the coast, all the others having been launched on the Great Lakes. The totals also include eight vessels with a total tonnage of 11,545 tons which will have oil engines in conjunction with electric motors for the final drive.

France

French launchings for 1923 comprised twenty-seven vessels of 96,644 tons.

The total figures include seven steamers of between 5,000 and 7,700 tons, one motor vessel of 8,500 tons, and one turbine-engined vessel of 10,015 tons.

Japan

The output for this country was forty-four vessels of 72,475 tons.

The 1923 totals comprise two steamers of about 6,500 tons each, one of which will be fitted with turbines, and one other turbine-engined vessel of 10,380 tons.

Italy

The output of Italian yards for 1923 comprised twenty-one vessels of 66,523 gross tons. Only two vessels of 7,515 tons were launched in the Trieste district.

The totals comprise eight vessels of between 5,900 and 8,400 tons each. Five turbine-engined vessels were launched with a total tonnage of 30,723 tons, and one motor vessel of 5,888 tons.

Holland

The total launchings for 1923 were thirty-five vessels of 65,632 tons. As usual, the figures for this country do not include vessels exclusively intended for river navigation, the total tonnage of which vessels often reaches a very high figure.

Only five vessels of between 5,000 and 7,000 tons each have been launched, and one turbine-engined vessel of about 11,000 tons.

The figures include five vessels fitted with steam turbines, with a total tonnage of 33,285 tons.

British Dominions

In all the British Dominions forty-four vessels with a total tonnage of 41,263 tons were launched.

Of the total figures, 15,260 tons were launched at Hong Kong, 13,998 tons in Australia, and 11,038 tons in Canada.

With the exception of the *Fordsdale*, of 9,650 tons, built at Sydney, N.S.W., no vessel of over 3,500 tons was launched during the year.

Scandinavian Countries

The total outputs of Denmark, Norway and Sweden amounted to eighty-two vessels of 126,216 tons, as follows: Denmark, twenty-four vessels, 49,479 tons; Norway, forty-eight vessels, 42,619 tons; and Sweden, ten vessels, 20,118 tons.

The total figures include five motor vessels of between 4,500 and 6,600 tons, while the largest steamer launched in these countries is of less than 3,300 tons.

The total tonnage of the steel vessels fitted with internal combustion engines launched in these countries during 1923 amounts to 44,756 tons.

SUMMARY

Country	Gross tons
Great Britain and Ireland.....	645,651
Germany.....	358,273
United States.....	172,817
Scandinavian Countries (Denmark, Norway, Sweden).....	112,216
France.....	96,644
Japan.....	72,475
Italy.....	66,523
Holland.....	65,632
British Dominions.....	41,263

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TONNAGE under Construction Close of 1923

Country	Gross tons
Great Britain and Ireland.....	1,395,181
Germany (excluding Danzig with 12,440).....	324,185
Italy.....	119,663
Holland.....	112,811
France.....	110,725
United States.....	91,585

TABLE Showing the Total Output of Merchant Vessels in the World During 1923

Where Built	Steamers		Motor Vessels		Sailing Vessels and Barges		Total	
	No.	Gross tons	No.	Gross tons	No.	Gross tons	No.	Gross tons
Great Britain and Ireland.....	179	553,223	21	87,244	22	5,184	222	645,651
Other countries.....	339	835,527	81	138,796	59	23,207	479	997,530
Total for the world.....	518	1,388,750	102	226,040	81	28,391	701	1,643,181

COMPARISON OF 1922 AND 1923 OUTPUTS OF MERCHANT SHIPPING

The world output of merchant shipping in 1922 was 2,467,084 gross tons; in 1923, 1,643,181 tons, a decrease of 823,903 tons.

The output of Great Britain and Ireland in 1922 was 1,031,081 tons; in 1923, 645,651 tons, a decrease of 385,430 tons.

The output of Germany in 1922 was 575,264 tons; in 1923, 358,273 tons, a decrease of 216,991 tons.

United States' output in 1922 was 119,138 tons; in 1923, 172,817 tons, an increase of 53,679 tons.

France's output in 1922 was 184,509 tons; in 1923, 96,644 tons, a decrease of 87,865 tons.

The output of Japan in 1922 was 83,419 tons; in 1923, 72,475 tons, a decrease of 10,944 tons.

Italy's output in 1922 was 101,177 tons; in 1923, 66,523 tons, a decrease of 34,654 tons.

Holland's output in 1922 was 163,132 tons; in 1923, 65,632 tons, a decrease of 97,500 tons.

The output of the British dominions in 1922 was 62,765 tons; in 1923, 41,263 tons, a decrease of 21,502 tons.

The output of the Scandinavian countries (Denmark, Norway, Sweden) in 1922 was 103,445 tons; in 1923, 112,216 tons, an increase of 8,771 tons.

In Sweden there was a decrease of 9,920 tons, in Norway an increase of 10,228 tons, and in Denmark one of 8,463 tons.

There has been a decline in the 1923 tonnage output of every maritime country, with the exceptions of the United States, Norway, and Denmark.

Both in Great Britain and Ireland and in Germany the 1923 output was somewhat less than two-thirds of the 1922 one; the decline in the British dominions and in Italy was about the same.

In France the 1923 output was about one-half the 1922 one, and in Holland considerably less than one-half.

GENERAL STATISTICS

In 1923 Great Britain and Ireland contributed 39.2 per cent of the world's output of merchant tonnage; in 1922, 41.8 per cent.

Germany in 1923 contributed 31.8 per cent of world tonnage; in 1922, 23.3 per cent.

Of the total output for the countries other than Great Britain and Ireland in 1923 Germany contributed 36 per cent, and the United States 17.6 per cent.

Of the total tonnage launched in 1923, thirty-six vessels of 304,000 tons were fitted with steam turbines. The average tonnage of these vessels reached 8,444 tons.

The tonnage of new vessels to be fitted with internal combustion engines shows a marked increase. In 1923, 226,000 tons of shipping thus fitted were launched, representing $16\frac{1}{4}$ per cent of the total world steam tonnage output for 1923; in 1922 the percentage was $9\frac{1}{2}$.

The tonnage of motor vessels to be fitted with internal combustion engines building at the beginning of 1924 represented 35 per cent of the world's steam tonnage then under construction.

Of steam and motor tankers of 1,000 tons and upwards, world launchings in 1923 comprised twenty-three vessels of 126,181 gross tons. The leading nations in the production of this class of vessel were Great Britain and Ireland with nine, total tonnage 58,188, and Germany with three, total tonnage 12,384. The figures for 1922 were sixty-one vessels of 355,854 gross tons.

During 1923, of vessels of 20,000 tons and over, three were launched in Great Britain, and one in Germany; of vessels of between 15,000 and 20,000 tons, one was launched in Great Britain; of vessels of between 10,000 and 15,000 tons, six were launched in Great Britain and Ireland, four in Germany, and one each in France, Holland, and Japan.

RELATIVE POSITIONS OF LEADING SHIPBUILDING NATIONS IN 1922 AND 1923

In 1922 the leading shipbuilding nations were Great Britain and Ireland, Germany, France, Holland, United States, and Italy, in the order named.

In 1923, they were Great Britain and Ireland, Germany, United States, the Scandinavian countries (Denmark, Norway, Sweden), France, Japan, Italy, and Holland, in the order named.

GERMANY'S POSITION AS A SHIPBUILDING NATION

In the weekly numbers of *Fairplay* from September 6 to October 4, 1923, there appeared a series of articles, five in all, styled "Germany from Within" by a representative of that paper, who was sent to Germany for the express purpose of investigating at first hand German industrial conditions generally, and in particular, those affecting the shipbuilding and shipping trades.

As representing a well-known English shipping journal he had exceptional opportunities for interviewing all sorts and conditions of men engaged in the shipping trade in that country, and of obtaining their views on the present condition of Germany's shipbuilding industry.

These views are reproduced in his articles, which may accordingly be taken as authoritative, and fairly near the mark, and which are obviously written solely from an economic standpoint.

Corrected official figures of German merchant shipping tonnages for the years herewith given are as follows:—

In 1906	Germany possessed.. ..	3,725,000 gross tons
In 1914	Germany possessed.. ..	5,238,937 "
In 1919	Germany possessed.. ..	672,671 "
In 1923	Germany possessed.. ..	2,590,073 "

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It will be seen that in the eight pre-war years Germany's output of merchant tonnage amounted to 1,513,937 gross tons; in the 4 years succeeding the war to 1,917,402 tons; in the four post-war years she built 403,465 tons more of merchant shipping than in the eight pre-war years. This is a notable achievement and a convincing proof of the efficiency and producing power of German yards. There is however a reverse side to the shield.

Germany's chief industrial disability to-day arises from the French occupation of the Ruhr, as the figures herewith given will show.

An abundant supply of coal is a dominant factor in an industrial country. Prior to the war Germany was a heavy exporter of coal; she is now a heavy importer. In the first six months of 1923 German exports of coal, irrespective of reparations deliveries, amounted to 1,069,000 tons; her imports totalled 15,760,000 tons. In 1913 the output of coal from the Ruhr was 72 per cent of the entire output of the German Empire; the Ruhr also produced in 1913, 54 per cent of German pig-iron and 53 per cent of German raw steel.

Prior to the French occupation almost the entire supply of steel plates for German ships came from the Ruhr, at a cost of between £6 and £7 per ton; rather than pay the French tax of 10 per cent the Germans at present are importing these plates from England, at a cost of £11 per ton.

An obstacle to the continued successful operation, not merely of German shipbuilding plants, but of German industries generally, is the fact, that they are financed almost entirely by foreign capital. Holland is Germany's chief backer, as is only natural, as the industrial prosperity of Holland is bound up with that of the German hinterland.

All imports are obtained in this way upon the credits or securities of the firms concerned.

That German industrialists have extensive foreign holdings is well known, how extensive is not known, but in any case these foreign loans are a constant drain on the German holdings, and Germany's foreign creditors are becoming increasingly restless, and unwilling to advance further credits, this would mean the curtailing or shutting down of many of Germany's industrial plants.

The following comparative table of percentage of German goods exported to foreign countries in 1913 and 1922 is of interest as showing the increase of German exports to Holland:—

	1923	1922
Great Britain.....	14.2	7.7
United States.....	7.1	7.6
Holland.....	6.9	17.2
Sweden, Norway and Denmark.....	6.7	11.6
France.....	7.8	2.6
Russia, Finland and the New Rand States.....	9.7	4.1

In 1913 the main strength and earning power of Germany's merchant marine were centered in those two great lines the Hamburg-American, and the Norddeutscher Lloyd, or North German Lloyd.

In 1913 the Hamburg-American line possessed a fleet of 194 ocean-going steamers, with a total gross tonnage of 1,307,411 tons. In 1923 the fleet comprised 70 vessels, gross tonnage 291,595 tons.

The North German Lloyd in 1913 had a fleet of 494 vessels, total gross tonnage 982,592 tons. In 1923 the fleet comprised 30 vessels, total gross tonnage 135,546 tons.

As already shown German building since the war has brought the German merchant marine up to about one-half of its pre-war strength. It will be seen, however, that the tonnages of the two chief German lines were in 1923, in the case of the Hamburg-American line, about one-fifth of its pre-war tonnage, and in the case of the North German Lloyd not quite one-seventh of its pre-war tonnage; a heavy falling off.

Unemployment in Germany at present, and consequent communistic agitation is in the opinion of the reviewer considerably greater than is generally supposed, and is increasing to the detriment of German industries generally, including shipbuilding and its allied trades.

At the beginning of December, 1922, the number of unemployed on the registers of 800 German exchanges was 259,700, with a total of 42,860 drawing out of work pay. At the end of December, 1922, the figures had increased to 276,871, and 82,427 respectively. Since then unemployment has been aggravated by a number of men deported from the Ruhr. In August, 1923, it was currently reported that the number of unemployed in Hamburg alone amounted to 300,000.

There was a time during 1922 when Germany was actually on a par with Great Britain as the leading shipbuilding nation; for the quarter ended June 30, 1922, Lloyds put the British launchings at 148,886 tons, and estimated the German launchings at 150,000 tons.

In 1923, however, German building declined to the extent of 216,991 tons, or between one-half and one-third of her 1922 output. In this, however, Germany was not exceptional, as the building decline during 1923 was a general one.

The purport of these articles goes to show that German shipbuilding plants at present are faced with very grave industrial difficulties; if they can be surmounted, Germany will continue to be, as in the past, a great shipbuilding and shipowning nation; if not, the alternative would seem to be something approaching economic collapse.

IMPROVEMENT IN 1924 SHIPPING OUTLOOK

As already pointed out merchant marine tonnage laid up in nearly every maritime country in 1922 had materially lessened in 1923.

From 1920 to 1923 there was an intense competition and cutting of rates among shipping companies on all trade routes resulting in operating deficits.

At the beginning of 1924, however, rates, both in the Atlantic and Pacific trades, became stabilized through conferences between the different shipping companies interested, and this, together with the laying up or scrapping of the less efficient types of freighters, had a wholesome and steadying effect on the world shipping situation, which was reflected in the quotations of marine stocks.

A March, 1924, shipping number of the *New York Journal of Commerce* stated that in August, 1923, International Mercantile Marine preferred stock was quoted at \$18, in December of the same year it had risen to \$33, and in March, 1924, remained steady at \$30.

This journal is of the opinion that the present regulated rates both in the Atlantic and Pacific trades will remain in operation for some time to come. Dislocation of European trade due to economic unrest is still an ugly feature of present day shipping conditions; could this be remedied, additional European cargoes would tend to still further relieve shipping congestion.

CANADIAN GOVERNMENT MERCHANT MARINE

COMPARISON OF OPERATIONS 1922 AND 1923

	December 31, 1922	December 31, 1923
Gross revenue.....	\$ 9,705,786 97	\$8,992,308 71
Operating expenses.....	12,089,976 14	10,856,601 85
Deficit from operation.....	2,384,189 17	1,864,293 14

It will be seen that the deficit from operation for 1923 was \$519,896.03 less than in 1922, and also that both the gross revenue and operating expenses were less in 1923 than in 1922.

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The decrease in operating expenses was due to cancellation of South American, Mediterranean, and certain other unremunerative services, and curtailment as far as possible of general expenses.

The decrease in gross receipts was due in part to strikes occurring during the year at Cardiff, Swansea, London, Antwerp, and Vancouver, which interfered with sailings and in part to difficulty in obtaining full return cargoes, which reduced profits.

TRADE ROUTES

In November, 1923, a new monthly service was inaugurated between Vancouver and the United Kingdom. This is expected to provide accommodation for western provinces farmers and shippers and exporters on the Pacific coast. During the year eight of the smaller vessels were employed in the grain trade on the Great Lakes. Four of the vessels trading to United Kingdom ports were fitted in the spring for the carriage of cattle. During the navigation season several of the smaller vessels were used on the St. Lawrence route for the carriage of pulpwood from the Maritime Provinces to Quebec and Ontario.

DISPOSITION OF FLEET AS AT DECEMBER 31, 1923

United Kingdom and Continent.....	12 vessels
Australia.....	9 "
Oriental ports.....	4 "
West Indies.....	6 "
Newfoundland.....	1 "
Vancouver-California.....	5 "
India.....	1 "
Great Lakes grain trade.....	7 "
Laid up—Halifax.....	9 "
Montreal.....	6 "
	<hr/>
	60 "

VOYAGES COMPLETED DURING THE YEAR

ATLANTIC

United Kingdom and Continent.....	65
West Indies—Freight.....	30
West Indies—Passenger.....	18
Newfoundland.....	18
Australia.....	14
	<hr/>
	145
Charters.....	157

PACIFIC

Australia.....	16
Orient.....	14
India.....	1
Coastal.....	51
	<hr/>
	82

REGULAR SAILINGS DURING THE YEAR

From the Atlantic

United Kingdom—

Fortnightly service to Cardiff and Swansea.

Fortnightly service to London and Antwerp.

West Indies—

Fortnightly freight service to St. Kitts, Antigua, Barbados, Trinidad and Demerara.

Three-weekly passenger and freight service to Bermuda, Nassau, Kingston and Belize.

Australia and New Zealand—

Monthly service to Auckland, Brisbane, Sydney, Melbourne and Adelaide.

Newfoundland—

Three-weekly service to St. John's, Newfoundland, via Charlottetown, Prince Edward Island.

From the Pacific

Pacific Coastal —

Weekly service to San Pedro and San Francisco.

United Kingdom—

New monthly service to United Kingdom started in November, 1923, to ports in English channel, Bristol channel and the west coast of United Kingdom.

Australia and New Zealand—

Monthly service to Auckland, Sydney, Melbourne and Adelaide.

Oriental—

Monthly service to Yokohama, Japan; and Shanghai, China; with occasional calls at Northern China ports.

VESSELS in Operation as at December 31, 1923

Canadian Adventurer.....	3,408
Canadian Aviator.....	5,166
Canadian Beaver.....	3,973
Canadian Britisher.....	8,100
Canadian Carrier.....	4,620
Canadian Challenger.....	8,423
Canadian Coaster.....	3,939
Canadian Commander.....	8,439
Canadian Conqueror.....	8,407
Canadian Constructor.....	10,500
Canadian Cruiser.....	10,682
Canadian Engineer.....	3,679
Canadian Explorer.....	8,341
Canadian Farmer.....	3,964
Canadian Fisher.....	5,100
Canadian Forester.....	5,100
Canadian Freighter.....	8,347
Canadian Gunner.....	3,978
Canadian Harvester.....	4,000
Canadian Highlander.....	8,449
Canadian Hunter.....	5,021
Canadian Importer.....	8,381
Canadian Inventor.....	8,350
Canadian Leader.....	8,456
Canadian Logger.....	3,839
Canadian Mariner.....	8,340
Canadian Miller.....	8,390
Canadian Miner.....	2,778
Canadian Navigator.....	4,581
Canadian Observer.....	3,982
Canadian Otter.....	4,555
Canadian Pathfinder.....	3,640
Canadian Pioneer.....	8,408
Canadian Planter.....	8,399
Canadian Prospector.....	8,367
Canadian Raider.....	5,181
Canadian Rancher.....	4,892
Canadian Ranger.....	8,382
Canadian Rover.....	3,920
Canadian Runner.....	4,573
Canadian Sailor.....	3,357
Canadian Sapper.....	2,781
Canadian Scottish.....	8,100
Canadian Sealer.....	2,777
Canadian Seigneur.....	8,391
Canadian Signaller.....	3,975
Canadian Skirmisher.....	8,424
Canadian Sower.....	3,406
Canadian Spinner.....	8,393

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VESSELS in Operation as at December 31, 1923—*Concluded*

Canadian Squatter.....	4,554
Canadian Trader.....	3,341
Canadian Transporter.....	8,356
Canadian Trapper.....	5,054
Canadian Traveller.....	8,439
Canadian Trooper.....	4,540
Canadian Victor.....	8,433
Canadian Volunteer.....	4,496
Canadian Voyageur.....	4,575
Canadian Warrior.....	3,995
Canadian Winner.....	8,407
Total fleet (60).....	362,844

VESSELS Sold During 1923

Canadian Settler.....	4,918
Thos. J. Drummond.....	3,501
Sheba.....	3,400
J. A. McKee.....	3,575

AMERICAN MERCHANT MARINE

The returns here given are taken from the annual report of the Commissioner of Navigation to the Secretary of Commerce for the American fiscal year ended June 30, 1923.

COMPARISON of American Merchant Fleet of 1922 and 1923

	1922		1923	
	Number	Gross tons	Number	Gross tons
Geographical Distribution—				
Atlantic and Gulf coasts.....	16,608	12,130,683	16,313	11,892,210
Pacific coast.....	6,298	3,473,581	6,244	3,495,751
Northern lakes.....	2,745	2,723,857	2,719	2,758,401
Western rivers.....	1,707	134,847	1,741	138,372
	27,358	18,462,968	27,017	18,284,734

VESSELS Built during Fiscal Years 1922 and 1923

	1922		1923	
	Number	Gross tons	Number	Gross tons
Geographical Distribution—				
Atlantic and Gulf coasts.....	503	505,170	421	215,634
Pacific coast.....	154	132,538	162	50,686
Northern lakes.....	63	8,102	57	60,279
Western rivers.....	125	15,422	130	9,031
	845	661,232	770	335,630

CURRENT AMERICAN SHIPBUILDING

On July 1, 1923, American shipyards were building or under contract to build for private shipowners 203 steel vessels of 172,301 gross tons, and five wood vessels of 1,004 gross tons.

Company	Steel		Wood	
	No.	Gross tons	No.	Gross tons
American Bridge Co., Ambridge, Pa.....	111	50,690	.....	.....
American Shipbuilding Co., Cleveland, Ohio.....	6	42,984	.....	.....
Arthur D. Storey, Essex, Mass.....	.....	.....	1	140
B. H. Elliot (Inc.), Houston, Tex.....	.....	.....	1	100
Bath Iron Works, Bath, Me.....	1	800	.....	.....
Bethlehem Shipbuilding Corporation—	.....	.....	.....	.....
Baltimore Dry Docks Plant, Baltimore, Md.....	1	920	.....	.....
Harlan Plant, Wilmington, Del.....	2	792	.....	.....
Sparrows Point Plant, Sparrows Point, Md.....	.....	.....	1	500
Booz Bros., Baltimore, Md.....	.....	.....	1	144
Charles Ward Engineering Works, Charleston, W.Va.....	4	1,030	.....	.....
Craig Shipbuilding Co., Long Beach, Calif.....	2	800	.....	.....
Dravo Contracting Co., Pittsburg, Pa.....	14	6,590	.....	.....
Federal Shipbuilding Co., Newark, N.J.....	2	2,500	.....	.....
Geo. Lawley & Son Corporation, Neponset, Mass.....	2	550	.....	.....
Great Lakes Engineering Works, Ashtabula, Ohio.....	2	3,200	.....	.....
Howard Shipyards Co., Jeffersonville, Ind.....	2	995	.....	.....
James Rees & Sons Corporation, Pittsburg, Pa.....	1	175	.....	.....
Johnson Iron Works, Dry Dock and Shipbuilding Co., New Orleans, La.....	1	250	.....	.....
Los Angeles Shipbuilding and Dry Dock Corporation, Los Angeles, Calif.....	3	712	.....	.....
Marietta Manufacturing Co., Point Pleasant, W.Va.....	10	3,279	.....	.....
Nashville Bridge Co., Nashville, Tenn.....	4	1,060	.....	.....
Newport News Shipbuilding and Dry Dock Co., Newport News, Va.....	3	14,250	.....	.....
New York Shipbuilding Corporation, Camden, N.J.....	13	16,715	.....	.....
Pusey & Jones Co., Wilmington, Del.....	3	2,190	.....	.....
Staten Island Shipbuilding Co., Mariners Harbor, N.Y.....	5	1,200	.....	.....
Sturgeon Bay Dry Dock Co., Sturgeon Bay, Wis.....	1	1,000	.....	.....
Sun Shipbuilding Co., Chester, Pa.....	6	6,169	.....	.....
Tebo Yacht Basin Co., Brooklyn, N.Y.....	2	450	.....	.....
Toledo Shipbuilding Co., Toledo, Ohio.....	2	13,000	.....	.....
Vinyard Shipbuilding Co., Melford, Del.....	.....	.....	1	120
Total.....	203	172,301	5	1,004

NATIONALITY OF CREWS, 1922 AND 1923

The following table shows the nationality of the officers (excluding masters) and men shipped and reshipped before shipping commissioners during 1922 and 1923.

Nationality	1922	1923
Americans (born).....	85,989	92,535
Americans (naturalized).....	26,284	27,611
British.....	27,551	24,736
Chinese.....	3,756	1,678
Japanese.....	467	165
Philipinos.....	3,395	5,194
Germans.....	8,098	14,093
Norwegians.....	7,227	6,404
Swedes.....	6,550	6,319
Danes.....	4,000	3,404
Russians.....	4,483	3,878
Austrians.....	828	1,081
French.....	703	689
Spanish.....	22,787	19,167
Italians.....	2,754	2,291
Portuguese.....	4,884	3,531
Others.....	25,792	26,556
Total.....	235,548	239,332
Per cent Americans.....	47.6	50.2

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As compared with 1922, percentage of Americans (born or naturalized) in the American 1923 merchant marine has increased by 2½ per cent, the number of Germans has nearly doubled, and British and Spaniards, which come next to the Americans in point of numbers, slightly decreased.

VALUE of American Foreign Trade Carried by American and Foreign Ships in
1922 and 1923

Year	Imports		Exports		Total American	Total Foreign
	In American vessels	In Foreign vessels	In American vessels	In Foreign vessels		
	\$	\$	\$	\$	\$	\$
1922.....	734,375,471	1,533,906,433	1,177,588,568	2,067,533,302	1,911,964,039	3,601,439,735
1923.....	1,054,944,070	2,230,235,779	1,292,872,059	2,064,880,605	2,347,816,129	4,295,116,384

OPERATIONS OF CHIEF CANADIAN SHIPBUILDING PLANTS

CANADIAN VICKERS, LTD., MONTREAL, P.Q.

Construction Work

Yard	Description of Vessel	Particulars of Vessel	Delivery
84	Hopper barge for the Canadian Government.	210'x35'x19' moulded steam single screw.	July, 1923.
85	Steel hull only for the Norway Bay Ferry Co.	67-6x19-8x6-9 moulded semi-Diesel, single screw.	May, 1923.
86	Steel hull for dipper dredge "John Kennedy."	104'x37'x10' and 8' 3" existing machinery transferred.	Delivery expected May, 1924.
87	Steel tug for the Hull and Ottawa Power Co.	45-9x10-6x5-2 semi-Diesel single screw..	" "
88	Steel scow for the Hull and Ottawa River Power Co.	100'x25'x6' 6" fitted for railroad cars....	April and May, 1924

Repair Work

Seventy-two vessels were dry-docked during the 1923 season, ranging in size from tug boats to 10,000-ton cargo ships; a majority of the vessels were lake carriers and sea-going cargo ships. The bottom repairs ranged from minor damages incurred among ice, up to extensive repairs due to collision and groundings; one cargo vessel was cut and lengthened 48 feet.

In addition to drydock work, 86 vessels were treated for minor repairs and overhaul, either in the company's own basin or at the vessel's berth in Montreal harbour.

DAVIE SHIPBUILDING AND REPAIRING CO., LTD., LAUZON, LEVIS, P.Q.

Construction Work

No.		Owners	Remarks
479	SS. tug.....	Department of Railways and Canals....	Steel hull only.
480	Pontoon.....	Canada Steamship Lines.....	
481	Pontoon.....	"	
482	T.S. shallow draft scow.....	Brown Corporation.....	Steel hull only.
483	T.S. auto ferry.....	La Traverse de Lachine.....	Vessel complete.

Ships Repaired

Name	Owners	Repairs
Cairndhu.....	Cairn Lines.....	Hull repairs.
Gaspesia.....	Clarke Steamship Co.....	Hull and engine repairs.
Lord Strathcona.....	Quebec Salvage & W. Co.....	"
Lightship No. 20.....	Department of Marine.....	Hull repairs.
Labrador.....	Clarke Steamship Co.....	"
Mikula.....	Department of Marine.....	"
Cartier.....	"	"
Polana.....	"	Reconditioning.
Arctic.....	"	Hull repairs.
J. S. Thom.....	Quebec & Levis Ferry Co.....	"
Essex County.....	Canada Steamship Lines.....	"
Briton.....	Buckeye Steamship Co.....	Cutting in 2 sections.
Canadian.....	Canada Steamship Lines.....	Hull repairs.
Guide.....	Bras d'Or Co.....	"
Laura Maersk.....	Norwegian owners.....	"
Jan.....	"	"
Loos.....	Department of Marine.....	"
Lady Grey.....	"	Hull and engine repairs.
Manoa.....	Canada Steamship Lines.....	"
Maplebrook.....	"	Hull repairs.
North Wind.....	Buckeye Steamship Co.....	Cutting in 2 sections.
Saguenay.....	Canada Steamship Lines.....	Hull repairs.
Saskatoon.....	"	"
Glenburnie.....	"	"
Mapledawn.....	Canada Steamship Lines.....	"
Welland County.....	"	"
West Kebar.....	U.S. Shipping Board.....	"
Beaverton.....	Canada Steamship Lines.....	"
Druid.....	Department of Marine.....	"
Glenellah.....	Canada Steamship Lines.....	"
Kenora.....	"	"
Mapleheath.....	"	"
Edmonton.....	"	"
Leicester.....	"	"
Maplebranch.....	Canada Steamship Lines.....	"
Montcalm.....	Department of Marine.....	"
Winona.....	Canada Steamship Lines.....	"
Rosecastle.....	Dominion Coal Co.....	Engine repairs.
Quebec.....	Canada Steamship Lines.....	Hull repairs.
Mapleton.....	"	"
Hassel.....	Danish owners.....	"
Richelieu.....	Canada Steamship Lines.....	"
Briseis.....	French owners.....	"
Melita.....	Canadian Pac. Steamships.....	Engine repairs.
Savoy.....	Anticosti Island Agency.....	Hull repairs.
Dredge New Weland.....	National Dock and Dredging Co... ..	"
Dredge 110.....	Department Public Works.....	"
Dredge 116.....	"	"
Storm King.....	"	"
Witherbee.....	"	"

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PORT ARTHUR SHIPBUILDING CO., LTD., PORT ARTHUR, ONT.

Repair Work

Total number of boats entering plant for repairs.....	158
Number of hull repair jobs involved.....	71
“ engine “ “	49
“ boiler “ “	43
“ miscellaneous “	31
	194

Dry Dock Report

Number of boats docked.....	16	Gross tonnage.....	64,131
Number of tugs docked.....	10		
Total.....	26		

No new construction.

MIDLAND SHIPBUILDING CO., LTD., MIDLAND, ONT.

No new construction. Repairs of varying dimensions were made to the following steamers: *Glendowan*, *Glenealy*, *Glenorchy*, *Glenlyon*, *Glendochart*, *Glengarnock*, *Glenfinnan*, *Glenrig*, etc.

Partial reconstruction was carried out on ss. *Hartnell*.

Rudder renewed on ss. *Alberta*.

Installation of water tank and relative piping system on ss. *Manitoba*.

WALLACE SHIPBUILDING AND DRY DOCK CO., LTD.

New Construction: One 500-ton scow, one 30-foot launch.

Reconditioning: SS. *Lady Evelyn*, ss. *Hercules*, ss. *Imperial*.

Repairs: Deep-sea Vessels—

SS. Hawaii Maru.....	Deck repairs.
SS. Camosum.....	Hull and engine repairs.
SS. Cowichan.....	Deck, engine and hull repairs.
SS. Baychimo.....	Deck and engine repairs.
SS. El Lobo.....	Engine repairs.
N.V. City Ferry No. 2.....	Deck, engine and hull repairs.
N.V. City Ferry No. 3.....	“ “
SS. Cardiganshire.....	Deck and engine repairs.
SS. Eastholme.....	Engine and hull repairs.
SS. Gunner.....	Deck repairs hull.
SS. Cheam.....	Deck, hull, engine and boiler.
SS. Canadian Skirmisher.....	Engine.
SS. Baychimo.....	Engine and deck repairs.
SS. Givinchy.....	Engine repairs
SS. Moerdyk.....	“
SS. Agnes Dollar.....	Deck repairs.
SS. Makura.....	Deck and engine repairs.
Transfer barge No. 2.....	Hull repairs.
R.M.S. Empress of Canada.....	Boiler and engine repairs.
SS. Hakata Maru.....	Deck repairs and engine.
SS. Canadian Farmer.....	Engine and deck repairs.
SS. Canadian Traveller.....	“ “
SS. Celtic.....	Hull, deck and engine repairs.
SS. Canadian Observer.....	Engine and hull repairs.
R.M.S. Empress of Russia.....	Deck and engine repairs.
SS. Canadian Scottish.....	Engine repairs.
SS. Hofuku Maru.....	“
R.M.S. Niagara.....	Engine, boilers, deck, oil and tank repairs.
R.M.S. Empress of Australia.....	Engine and deck repairs.
SS. Polarim.....	Engine repairs.
SS. Prince John.....	Deck, hull, engine and boiler.
Transfer Barge No. 4.....	Hull repairs.
SS. Ballena.....	Hull and engine repairs.
SS. Clansman.....	Engine repairs.
SS. Chilkoot.....	Hull, engine and deck repairs.

Repairs: Deep-sea Vessels—*Continued.*

R.M.S. Empress of Asia.....	Engine and deck repairs.
SS. Canadian Winner.....	Engine and deck repairs.
SS. Defender.....	Engine repairs.
Tanker La Habra.....	Engine and deck repairs.
SS. Canadian Prospector.....	Deck and boiler repairs.
SS. Canadian Highlander.....	Deck and engine repairs.
SS. Cardena.....	Deck, hull and engine repairs.
M.S. Lima.....	Deck and engine repairs.
SS. Canadian Volunteer.....	Engine and deck repairs.
SS. E. D. Kingsley.....	Engine, hull and deck.
SS. Anyox.....	Deck, engine, boiler and hull.
SS. Canadian Britisher.....	Engine.
SS. Chelohsin.....	Hull and engine.
SS. Canadian Importer.....	Deck and engine.
SS. Coaster.....	Engine and boiler.
Schooner Wm. Taylor.....	Hull repairs.
SS. Venture.....	Hull, engine, boiler and deck.
SS. Thoedis.....	Engine.
Bktme. S. F. Tolmie.....	Hull and deck.
SS. Calonne.....	Engine and deck.
SS. Kasha Maru.....	Engine.
SS. Canadian Inventor.....	Boiler, engine, deck and hull.
SS. Malaspina.....	Hull.
SS. Albertolite.....	Deck.
SS. Margaret Coughlin.....	Engine and deck.
SS. Princess Louise.....	Deck and engine.
SS. Toshiu Maru.....	Deck.
Schooner S. N. Castle.....	Hull and deck.
M.S. Siam.....	Deck, engine and hull.
SS. Amur.....	Engine, boiler and deck.
SS. Prince Rupert.....	Engine.
SS. Cheakamus.....	Engine and hull.
SS. Lampoc.....	Engine and deck.
SS. Arabian.....	Deck and engine.
SS. San Joaquin.....	Boiler.
SS. U.S. Peru.....	Engine.
SS. Colligian.....	Deck.
SS. Hindustan.....	"
SS. Dintledyk.....	Engine.
SS. Aden Maru.....	Deck.
SS. Jacques Cartier.....	"
SS. Antar.....	Deck and engine.
SS. Zyama Maru.....	Engine.
SS. Canadian Scottish.....	Deck, engine and hull.
SS. Pacific.....	Engine.
SS. Venice Maru.....	Deck.
SS. India Maru.....	Engine.
SS. Zillamook.....	Hull.
SS. Narenta.....	Engine and deck.
SS. Canadian Rover.....	Hull, engine and deck.
SS. Ariagamenti.....	Engine and deck.
SS. Baxter.....	Deck.
SS. Faxen.....	Deck and engine.
SS. Canora.....	Engine and deck.
M.S. Canada.....	Deck.
SS. Canadian Trooper.....	Engine.
SS. Talabot.....	Deck.
SS. Capetown Maru.....	Engine, boilers and deck.
SS. Elida Clausen.....	Deck and engine.
SS. Laponia.....	Engine.
SS. Royal Prince.....	Boiler and engine.
SS. Northwestern Miller.....	Deck.
SS. China Maru.....	Engine and deck.
SS. Bordeau Maru.....	Engine.
SS. Roman Star.....	Deck and engine.
SS. San Francisco Maru.....	Engine and boilers.
M.S. Culburra.....	Boiler and engine.
SS. Rhine Maru.....	Engine.
SS. Salatiga.....	Deck.
SS. Manulani.....	Deck and engine.
SS. Elveric.....	Deck.
SS. Laristan.....	Engine.
SS. Prince George.....	Deck.
SS. Lompoc.....	Engine.
SS. Holland Maru.....	"
SS. England Maru.....	"
SS. Montpelier.....	Engine and deck.
SS. Victoria Maru.....	Deck.

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Repairs: Deap-seau Vessels—*Concluded*

SS. Australien.....	“
SS. Diana Dollar.....	“
SS. Hayo Maru.....	Engine.
SS. Keifuku Maru.....	Deck and engine.
SS. Kinderdyk.....	Engine, boilers and deck.
SS. Eastway.....	Engines.
SS. Inkum.....	Deck.
M.S. Loch Goil.....	Engine.
SS. Fuji Maru.....	Hull.
SS. London Shipper.....	Deck.
SS. Maru Marsh.....	Engine.

In addition repairs were effected to 42 tugs, 15 scows, 5 dredges, 2 launches and 9 barges, and to 64 vessels lined for the carrying of grain.

STATISTICS OF CANADIAN SHIPPING
STATEMENT of Vessels Built in Canada and Registered During the Year 1923

	Wood						Metal						Totals					
	Sailing			Steam			Gas			Steam					Gas			
	Tonnage			Tonnage			Tonnage			Tonnage					Tonnage			
	No.	Gross	Net	No.	Gross	Net	No.	Gross	Net	No.	Gross	Net	No.	Gross	Net			
New Brunswick.....	4	62	62	2	45	34	8	174	117							14	281	213
Nova Scotia.....	14	1,985	1,404				24	929	715							38	2,914	2,119
Ontario.....	4	424	424	6	1,041	677	10	203	134							23	5,551	3,652
Quebec.....	5	491	446	2	173	62	10	306	209							20	3,415	1,970
British Columbia.....	61	10,454	10,375	4	472	3	35	1,811	1,100							100	12,737	11,478
Prince Edward Island..							3	36	30							3	36	30
Saskatchewan.....																		
Manitoba.....	2	186	186	1	404	288	2	50	35							5	640	509
Yukon.....	1	211	211	1	553	348										2	764	539
Totals.....	91	13,813	13,108	16	2,688	1,412	92	3,509	2,340							205	26,338	20,530

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STATEMENT Showing the Number of Vessels and Number of Tons on the Registry Books of the Dominion, on December 31, 1923

Ports	Sailing Vessels			Steam Vessels		
	Number	Gross tons	Net tons	Number	Gross tons	Net tons
<i>New Brunswick—</i>						
Campbellton.....				1	68	13
Chatham.....	285	7,849	7,575	133	4,339	2,800
Dorchester.....	2	277	262	2	8	6
Moncton.....	2	28	26			
Richibucto.....	20	363	353	14	257	191
Sackville.....	1	12	12	1	16	11
St. Andrews.....	110	1,905	1,850	45	978	703
St. John.....	157	15,398	14,830	100	14,949	10,166
	577	25,832	24,908	296	20,615	13,890
<i>Nova Scotia—</i>						
Amherst.....	2	97	80	2	59	50
Annapolis Royal.....	11	2,746	2,433	8	677	423
Arichat.....	61	1,617	1,560	30	508	471
Barrington Passage.....	30	679	649	38	818	724
Canso.....	33	936	883	9	190	174
Digby.....	57	2,564	2,448	21	1,205	895
Guysboro.....	3	308	279			
Halifax.....	121	7,888	7,604	148	55,077	33,975
Lahave.....	35	7,735	6,150	6	448	406
Liverpool.....	19	1,997	1,781	22	1,119	654
Lunenburg.....	188	24,219	18,875	161	4,790	3,570
Maitland.....	5	723	646	1	88	59
Parrsboro.....	47	14,819	13,590	16	1,265	905
Pictou.....	12	2,723	2,517	13	2,134	1,358
Port Hawkesbury.....	24	373	373	8	208	173
Port Medway.....	4	226	226	4	60	56
Shelburne.....	33	1,417	1,408	23	1,044	822
Sydney.....	61	4,277	4,049	46	3,400	1,730
Truro.....				1	18	7
Weymouth.....	17	5,427	4,750	16	865	617
Windsor.....	27	14,615	13,443	17	4,300	2,616
Yarmouth.....	66	2,292	2,185	59	9,983	5,027
	856	97,678	85,929	649	88,256	54,712
<i>Ontario—</i>						
Amherstburg.....	4	602	602	8	895	471
Belleville.....	2	72	72	10	232	138
Bowmanville.....	1	146	146			
Brockville.....	1	819	751	14	530	339
Chatham.....	6	829	819	7	333	224
Cobourg.....						
Collingwood.....	4	1,119	1,119	48	17,357	11,676
Cornwall.....				5	173	101
Deseronto.....	5	403	370	3	31	22
Dunnville.....	1	87	57			
Fort William.....	1	413	413	2	124	69
Goderich.....	4	675	675	26	1,422	943
Hamilton.....	3	807	780	21	9,188	5,701
Kenora.....	6	535	535	89	3,845	2,445
Kingston.....	47	8,209	7,302	103	9,476	5,655
Lindsay.....				12	397	271
Midland.....	7	3,681	3,166	58	68,911	44,505
Napanee.....	1	122	122			
Oakville.....	1	26	26			
Ottawa.....	108	17,208	16,219	206	41,577	21,107
Owen Sound.....	6	2,708	2,436	31	3,262	2,180
Peterboro.....	22	1,744	1,744	47	1,004	687
Pictou.....	5	2,066	1,885	9	3,962	2,787
Port Arthur.....	65	19,984	19,613	76	23,752	14,183
Port Burwell.....				8	285	146
Port Dover.....	1	68	68	13	403	253
Port Hope.....	1	213	190			
Port Stanley.....				23	936	598
Prescott.....	8	1,323	1,195	12	2,262	1,528
Sarnia.....	9	2,212	1,978	38	32,000	19,838

15 GEORGE V, A. 1925

STATEMENT Showing the Number of Vessels and Number of Tons on the Registry Books of the Dominion, on December 31, 1923—*Concluded*

Ports	Sailing Vessels			Steam Vessels		
	Number	Gross tons	Net tons	Number	Gross tons	Net tons
<i>Ontario—Con.</i>						
Sault Ste. Marie.....	38	7,636	7,355	48	18,682	11,602
St. Catharines.....	21	5,937	5,356	47	2,053	1,308
Simcoe.....	2	36	36	2	35	18
Southampton.....				8	282	191
Toronto.....	55	14,160	12,256	233	117,980	75,939
Wallaceburg.....	2	490	475	7	316	220
Whitby.....						
Windsor.....	12	2,536	2,396	14	4,342	2,548
	449	96,866	90,157	1,228	366,047	227,693
<i>Quebec—</i>						
Gaspe.....	11	475	435	4	284	202
Magdalen Islands.....	9	441	432	1	135	92
Montreal.....	265	87,359	83,726	446	487,905	294,684
Paspebiac.....	10	229	219	11	334	239
Quebec.....	308	32,809	31,795	167	29,669	17,144
Sorel.....	25	9,949	8,910	41	11,351	5,299
	628	131,262	125,517	670	529,678	317,660
<i>British Columbia—</i>						
New Westminster.....	108	17,713	17,673	250	10,181	5,606
Prince Rupert.....	4	1,227	1,227	93	15,444	9,240
Vancouver.....	371	64,354	63,608	911	176,049	106,629
Victoria.....	112	25,044	24,093	252	67,650	40,412
	595	108,338	106,601	1,506	269,324	161,888
<i>Prince Edward Island—</i>						
Charlottetown.....	99	6,748	6,319	34	7,069	3,281
<i>Saskatchewan—</i>						
Prince Albert.....	1	145	145	5	588	341
<i>Manitoba—</i>						
Winnipeg.....	24	4,953	4,953	69	8,039	5,254
<i>Yukon Territory—</i>						
Dawson.....	2	407	407	6	1,850	1,225
Grand Total.....	3,231	472,229	444,936	4,463	1,291,466	785,944

RECAPITULATION

Province	Sailing Vessels			Steam Vessels		
	Number	Gross tons	Net tons	Number	Gross tons	Net tons
New Brunswick.....	577	25,832	24,908	296	20,615	13,890
Nova Scotia.....	856	97,678	85,929	649	88,256	54,712
Ontario.....	449	96,866	90,157	1,228	366,047	227,693
Quebec.....	628	131,262	125,517	670	529,678	317,660
British Columbia.....	595	108,338	106,601	1,506	269,324	161,888
Prince Edward Island.....	99	6,748	6,319	34	7,069	3,281
Saskatchewan.....	1	145	145	5	588	341
Manitoba.....	24	4,953	4,953	69	8,039	5,254
Yukon Territory.....	2	407	407	6	1,850	1,225
	3,231	472,229	444,936	4,463	1,291,466	785,944

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STATEMENT Showing the Number of Vessels Removed from the Registry Books
of the Dominion, During the Year Ended December 31, 1923

Sold to foreigners.....	16
Wrecked.....	19
Stranded.....	13
Lost.....	8
Broken up.....	107
Abandoned at sea.....	7
Collisions.....	2
Foundered.....	9
Burnt.....	25
Transferred to St. John's, Nfld.....	4
Transferred to Great Britain.....	6
Transferred to British West Indies.....	3
Transferred to Australia.....	1
Transferred to Hong Kong.....	1
Missing.....	1
Seized by United States Government for smuggling.....	2
Total.....	224

It is estimated that 43,733 men and boys, etc., inclusive of masters, were employed on the ships registered in Canada during the year 1923

COMPARATIVE STATEMENT showing the Number of Vessels and Number of Net Tons on the Registry Books of the Dominion of Canada, on December 31, in each Year from 1914 to 1923, both inclusive

Province	1914		1915		1916		1917		1918	
	Vessels	Tons	Vessels	Tons	Vessels	Tons	Vessels	Tons	Vessels	Tons
New Brunswick.....	1,052	55,522	1,068	56,219	1,074	49,817	1,074	49,883	1,043	49,483
Nova Scotia.....	2,098	135,053	2,087	125,567	2,064	123,058	2,010	119,805	1,948	124,517
Quebec.....	1,663	259,143	1,590	267,897	1,452	273,770	1,391	283,942	1,318	175,235
Ontario.....	2,100	314,660	2,111	312,971	2,116	328,531	2,079	311,283	2,064	312,865
Prince Edward Island.....	149	10,029	158	11,518	155	10,652	157	10,955	158	10,805
British Columbia.....	1,591	147,192	1,643	144,835	1,687	145,525	1,734	183,002	1,928	231,513
Manitoba.....	103	7,999	84	7,480	95	8,953	5	530	96	9,791
Yukon District.....	11	2,295	11	2,295	11	2,295	99	9,834	8	2,040
Saskatchewan.....	5	529	5	530	5	530	10	2,204	5	529
	8,772	932,422	8,757	929,312	8,659	943,131	8,559	971,438	8,568	1,061,778

Province	1919		1920		1921		1922		1923	
	Vessels	Tons	Vessels	Tons	Vessels	Tons	Vessels	Tons	Vessels	Tons
New Brunswick.....	1,018	42,050	917	38,634	859	40,456	866	39,107	873	38,798
Nova Scotia.....	1,965	158,100	1,709	152,130	1,550	153,461	1,523	146,329	1,505	140,641
Quebec.....	1,340	342,424	1,321	409,442	1,252	449,817	1,693	316,524	1,298	443,177
Ontario.....	1,986	320,065	1,793	313,875	1,681	306,944	1,314	459,207	1,677	317,850
Prince Edward Island.....	158	10,726	143	9,993	137	9,560	2,006	259,103	133	9,600
British Columbia.....	2,006	207,708	1,930	217,481	1,908	252,876	138	9,615	2,101	268,489
Manitoba.....	89	9,160	83	9,119	86	9,599	6	486	93	10,207
Yukon District.....	6	1,133	4	813	4	813	91	10,340	8	1,632
Saskatchewan.....	5	529	4	393	5	447	4	813	6	486
	8,573	1,091,895	7,904	1,151,880	7,482	1,223,973	7,641	1,241,524	7,694	1,230,880

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COMPARATIVE STATEMENT of Vessels Built and Registered in the Dominion of Canada and their Net Tonnage during the Year ended December 31, in each Year from 1914 to 1923, both inclusive

Province	1914		1915		1916		1917		1918	
	Vessels	Tons	Vessels	Tons	Vessels	Tons	Vessels	Tons	Vessels	Tons
New Brunswick.....	31	1,319	22	1,114	22	332	23	1,156	16	2,590
Nova Scotia.....	56	3,303	51	2,982	65	7,661	86	14,781	110	27,831
Quebec.....	51	6,753	49	7,790	51	8,643	32	8,058	26	9,086
Ontario.....	78	23,567	38	4,709	26	5,507	21	3,949	48	10,098
Prince Edward Island.....	2	35	2	24					4	78
British Columbia.....	97	5,867	79	2,057	65	4,487	77	17,452	192	54,889
Manitoba.....	11	2,899	5	156	15	1,573	4	881	1	39
Yukon District.....										
Saskatchewan.....										
	327	43,246	246	18,832	244	28,303	243	46,277	397	104,611

Province	1919		1920		1921		1922		1923	
	Vessels	Tons	Vessels	Tons	Vessels	Tons	Vessels	Tons	Vessels	Tons
New Brunswick.....	14	3,026	5	103	5	547	18	192	14	213
Nova Scotia.....	163	43,877	87	15,440	38	12,357	26	1,704	38	2,119
Quebec.....	46	45,831	82	48,303	41	30,800	24	7,379	20	1,970
Ontario.....	37	10,858	14	3,004	17	2,386	67	6,647	23	3,652
Prince Edward Island.....	5	507	4	270			90	8,266	3	30
British Columbia.....	138	23,396	136	35,512	72	22,939			100	11,478
Manitoba.....	4	143			7	572	1	39	5	509
Yukon District.....					1		11	1,698	2	559
Saskatchewan.....										
	407	127,938	329	102,779	181	69,655	237	25,925	205	20,530

VESSELS Built in 1923 and Exported without being Registered in Canada

SAIL—WOOD			
Province	Number	Gross tonnage	Net tonnage
Nova Scotia.....	1	59	59

REPORT OF B. H. FRASER, M.E.I.C., CHIEF ENGINEER

OFFICE WORK

Total plans for twelve months.. . . .	2,627
Charts received and recorded.. . . .	60
Photographs received and recorded.. . . .	163
Specifications and bills of materials written.. . . .	100
Waterlots, lighthouse sites, etc..	117

PUBLICATIONS

Ninety Notices to Mariners were issued, covering 266 subjects.
The following may be specially noted:—

- Change in traffic signals and regulations at Prospect point, B.C.
- Amendment to regulations governing the operation of swing spans of rail-
way bridges over navigable waters.
- Radio beacon stations established.
- Radio direction finding stations established.
- Sailing directions for Malaspina inlet.
- Sailing directions for Gunboat passage.
- Regulations for the navigation through or under and the lighting of bridges
over navigable waters in Canada.
- Sailing directions for the channels from Idol point to Ocean Falls.
- Weather, ice and other reports transmitted by radio.
- Gulf of St. Lawrence ice patrol.
- Notices relating to waters outside Canada.
- The annual edition of the List of Lights, in three sections, was issued.
- The construction of storm signal masts for the Meteorological Branch
were attended to by this branch at the following places: Neils harbour, N.S.;
Westport, N.S.; Tignish, P.E.I.; Cap aux Os, P.Q.; and Natashkwan, P.Q. Sig-
nal mast at Chebucto Head for Signal Service Branch.
- The construction of a wooden dwelling at Red Head, N.B., for the Radio
Branch, a steel semaphore tower at Point Nicolas, P.Q., for River St. Lawrence
Ship Channel Branch, and repairs to the foundation of lifeboat house at Char-
lottetown, P.E.I., for Life Saving Branch.

ICE-BREAKING

The contract with the Great Lakes Transportation Company, to keep the
harbours at the head of lake Superior open for navigation until December 17,
in each year, and to open them in the spring as soon as the canal at Sault Ste.
Marie is open for navigation, expired July 2, 1923.

New tenders for a 5-year contract were called dating from July 2, 1923, to
July 2, 1928, the lowest tender was received from the Canadian Towing and
Wrecking Company, Limited, of Port Arthur, Ontario, being \$30,000 per annum,
which was accepted.

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REMOVAL OF OBSTRUCTIONS

Halidays' wharf, P.E.I.	Wreck of <i>Katie</i> and <i>Ellen</i> removed by departmental diver.
Annandale, P.E.I.	Schooner <i>Beulah</i> , wrecked at Grand river, removed by departmental diver.
Halidays' wharf, P.E.I.	<i>Maggie May</i> , removed by departmental diver.
Georgetown, P.E.I.	<i>Circassian</i> , removed by departmental diver.
Near Charlottetown, P.E.I.	<i>Malabar</i> , removed by departmental diver.
Charlottetown, P.E.I.	<i>Milo</i> , removed by departmental diver.
Montague, P.E.I.	<i>Alf. B. Parker</i> , removed by departmental diver.
Gaspereaux river, N.B. at Port Elgin.	Debris of old bridge removed by owners.
False passage, N.S. (near Mary Joseph).	Schooner <i>Preceptor</i> removed under contract by Mr. Turner.
Bliss island, N.B.	The masts of schooner <i>Centenial</i> which were a menace to navigation were removed by C.G.S. <i>Laurentian</i> .
Beaver harbour, N.B.	Schooner <i>Flora M</i> , which was a menace to navigation was moved to a safe position.
South of Partridge Isd., N.B.	Schooner <i>Maid of Scotland</i> which was rammed by Str. <i>Perene</i> and sunk, was removed under contract by Swanton Bros.
Seal Cove, N.B.	A few rocks in channel were removed.
St. Martins, N.B.	The wreck of schooner <i>Telumah</i> was moved by the owners to a safe position.
Weymouth, N.S.	Logs obstructing navigation were removed.
Port Williams, N.S.	Schooner <i>Whisper</i> , wrecked at the wharf, was removed under contract by The Gypson Company of Windsor.
Gaspé, P.Q.	Schooner <i>Minnie May</i> , which filled with water and sunk in the port, was removed by the owners.
Sorel, P.Q.	Removal of old sunken barge.
Coldwater, Ont.	Steam launch <i>Lucu</i> , sunk near wharf, was removed by owner.
Goderich, Ont.	Wreck of barge <i>Olga</i> removed by owners.
Port Stanley, Ont.	Fish tug <i>Glen Erie</i> , burnt at harbour, was removed by owner.
Port Stanley, Ont.	Fish tug <i>Choctaw</i> was removed by owner.
Port Stanley, Ont.	The wreck of <i>D. M. Morrison</i> was removed by owner.
Rondeau, Ont.	The wrecks of tugs <i>Agnes W</i> and <i>St. Williams</i> were removed by owner.

MAINTENANCE AND REPAIRS TO WHARVES

Repairs to wharves were attended to by this Branch at the following places:—

Nova Scotia—

Port Clyde,
Shelburne,
Canada creek,
Carrs brook,
Church point,
Clarks harbour,
Kingsport,
Digby,
Meteghan,
Pickets wharf,
Saulnierville,
Shag harbour,
Tiverton,
Cheticamp,
Isaacs harbour.

New Brunswick—

Comeau cove,
Lorneville,
Whites Bluff,
Tracadie.

Ontario—

Magnetawan,
Petawawa,
The Pas.

Prince Edward Island—

Alberton,
Belfast,
China point,
Franklin wharf,
Grindstone,
Hickeys wharf,
North Cardigan,
St. Marys bay,
Sturgeon wharf,
Victoria.

British Columbia—

Hope bay,
Powell river,
Royston,
Summerland.

Quebec—

Berthier-en-Bas,
Chicoutimi,
Grand river,
Perce,
Riviere aux Vases,
Roberval,
St. Alphonse,
St. Anne des Monts,
St. Irene,
St. Luce,
Seven islands,
Graham,
St. Anne de Bellevue,
Treadwell,
Ville Marie.

NOVA SCOTIA AGENCY

NEW AIDS TO NAVIGATION

- Crichton head.. .. Hand fog horn.
- Rochford point, Louisburg ..Erection of wooden range light towers showing white catoptric lights.

Changes and improvements in existing aids also miscellaneous items of construction, repairs and replacements at the following places:—

- Battery point Hand fog horn.
- Chebucto head.. .. Oil shed.
- Dartmouth.. .. 45 fathoms 1 $\frac{3}{4}$ -inch chain.
74 shackles.
105 fathoms 1 $\frac{1}{4}$ -inch chain.
420 fathoms 1 $\frac{1}{4}$ -inch close link chain.
210 fathoms each of $\frac{1}{2}$ -inch, $\frac{5}{8}$ -inch and $\frac{7}{8}$ -inch close link chain.
30 cedar spars.
32 cast-iron castings for gas and whistling buoys.
Painting of buildings.
Repairs to wharf.
6 double hand fog horns.
57 granite anchors.
120 fathoms 4-inch steel wire rope.
25 each of 1 $\frac{1}{2}$ -inch, 1 $\frac{3}{4}$ -inch and 2-inch key shackles.
Extra work fitting up "Vimy" as a lightship.
- Egg island.. .. Erection of a dwelling.
- Fort point.. .. Repairs to fence and breakwater.
- Glace bay.. .. Front range destroyed by fire, replaced by a tower.
- Louisburg.. .. Erection of a reinforced concrete tower and wooden dwelling.
- Louisburg range.. .. Reflector with lamp.
- Pearl island.. .. Hand fog horn.
- Port Morien.. .. Provision of an anchor lantern.
- Sambro.. .. Repairs to tower and dwelling.
- Scatarie.. .. Construction of wooden double dwelling.
- Three Top island.. .. Repairs to dwelling.

NEW BRUNSWICK AGENCY

NEW AIDS TO NAVIGATION

- Hantsport.. .. Installation of 6th order lens on gable of warehouse.
 - North Head.. .. Erection of a pole light with shed at base.
 - Oak Point.. .. Erection of a pole light with shed at base.
- Changes and improvements in existing aids, also miscellaneous items of construction, repairs and replacements at the following places:—
- Apple river.. .. Installation of type "B" diaphone plant.
 - Bliss island.. .. Set of screens for occulting apparatus.
 - Cape Sable.. .. Erection of an 86-foot reinforced concrete tower and 10-foot cast-iron lantern.
 - Economy.. .. Erection of a pole light.
 - Head harbour.. .. Construction of a concrete retaining wall.
 - Minasville.. .. Re-erection of pole light on breakwater.
 - Musquash.. .. Provision of a Reliance clock.
 - Pecks point.. .. New one-inch diaphone.
 - Point Prim.. .. Repairs to lighthouse and lantern.
 - Pompey Ledge.. .. Repairs to spindle.
 - St. John.. .. Thimbles and splicing hawsers at No. 15 wharf.
Electric wiring of sheds No. 7 and No. 15.
Two gas and whistling buoy superstructures.
Two deep-draught gas and whistling buoy floats.
Four buoy mooring pennants.
Four 300-lb. Meneely bells.
Eleven generator tubes.

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NEW BRUNSWICK AGENCY—*Concluded*CHANGES AND IMPROVEMENTS, ETC.—*Concluded*

St. John.. . . .	Overhauling and renovating electric wiring and repairs to sheds.
	580 fathoms $1\frac{1}{4}$ -inch middle link chain.
	10 600-lb. cast-iron ball weights.
	48 fathoms $\frac{5}{8}$ -inch chain.
	400 fathoms 1-inch middle link chain.
	420 fathoms $1\frac{1}{4}$ -inch middle link chain.
	30 fathoms $\frac{1}{2}$ -inch close link chain.
	80 fathoms $\frac{5}{8}$ -inch close link chain.
	200 fathoms $\frac{3}{4}$ -inch close link chain.
	4 American type bells.
	12 cast-iron ball weights.
	200 fathoms $1\frac{1}{4}$ -inch close link chain.
	150 fathoms $1\frac{1}{2}$ -inch close link chain.
	30 $1\frac{1}{2}$ -inch x 36-inch anchor eyebolts.
	18 $1\frac{3}{4}$ -inch x 36-inch anchor eyebolts.
	Swivels and shackles.
	8 8,000-lb. granite anchors.
Sandy ledge.. . . .	Rebuilding spindle.
Seal island.. . . .	Position of diaphone resonator changed.
West Head, Cape Sable island.	Installation of 5th order lens.
Yarmouth.. . . .	Repairs to steamer <i>John C. Stoneman</i> , used temporarily as a lightship.

PRINCE EDWARD ISLAND AGENCY

NEW AIDS TO NAVIGATION

Burnt Church	Establishment of a pole light with shed at base, Anchor lantern.
Cap Rouge.. . . .	Establishment of a pole light with shed at base, pressed lens lantern.
Haldimand gully.. . . .	Range pole lights with sheds at base.
Changes and improvements in existing aids, also miscellaneous items of construction, repairs and replacements at the following places:—	
Alberton.. . . .	Front range light moved to a new location, and back light pole renewed.
Belle isle S.W...	General repairs to high and low lights.
Bird Rocks.. . . .	Provision and installation of a hoisting engine, etc.
Brighton range.. . . .	Repairs to foundation.
Cape Anguille.. . . .	Repairs to verandah, steps, etc.
Cape Tormentine.. . . .	Repairs to back light.
Charlottetown.. . . .	Oxy-acetylene welding outfit.
	150 fathoms $\frac{1}{2}$ -inch close link chain.
	150 fathoms $\frac{5}{8}$ -inch close link chain.
	50 fathoms $\frac{7}{8}$ -inch close link chain.
	6 1,500-lb. granite anchors.
	Repairs to float.
	10 325-lb. concrete anchors.
	36 special wrought-iron anchors.
East point.. . . .	Construction of dwelling.
Entry island.. . . .	Completion of work of construction of fog alarm, dwelling, etc., started last year.
Grand Entry.. . . .	Range lights moved to a new location.
Indian Rock.. . . .	12-foot. superstructure for buoy.
Mabou.. . . .	Repairs to front and back lights.
Point Prim.. . . .	12-foot superstructure for buoy.
Point Amour.. . . .	Completion of alterations to dwelling, repairs, etc. Work started last year.
St. Mary island.. . . .	Storm doors provided.
Shediac.. . . .	Temporary walk to back light.
Shippigan gully.. . . .	Anchor lanterns replaced by headlight lanterns.

QUEBEC DISTRICT

NEW AIDS TO NAVIGATION

Green island (West wharf) ..	Mast light and shed.
Green island (East wharf) ..	Wharf light.
Johan Beetz bay.. .. .	Mast range lights, Anchor lantern front light, headlight lantern for back light.
Long Point of Mingan.. .. .	Pole light, Anchor lantern.
Miscou wharf light.. .. .	Pole light, pressed lens lantern.
Petite Vallee.. .. .	Pole range lights, headlight lanterns.
Quetachua bay.. .. .	Pole range lights and headlight lanterns.
Riviere des Vases.. .. .	Pole light.
St. Francois river.. .. .	Pole range lights, pressed lens lanterns.
St. Maurice de l'Echourie.. ..	Pole light to form a range, headlight lantern.
Trinity bay.. .. .	Pole light, Anchor lens lantern.

Changes and improvements in existing aids, also miscellaneous items of construction, repairs and replacements at the following places:—

Bagot Bluff.. .. .	Repairs to tower.
Bathurst.. .. .	Repairs to back range pier.
Bersimis.. .. .	Headlight lantern for back light.
Cape Chat.. .. .	Erection of dwelling to replace residence destroyed by fire.
Chicoutimi.. .. .	Installation of 7th order illuminating apparatus to replace former destroyed by fire.
Cloridorme.. .. .	Change in alignment of range lights.
Eskimo point.. .. .	Headlight lantern.
Heath point.. .. .	Repairs to powder magazine, storehouse and stable.
Pointe Bleue.. .. .	8-inch pressed lens lantern.
Quebec.. .. .	2 bell buoy floats.
	Repairs to time recording clocks.
	4 gas buoy floats.
	Repairs to boiler.
	Provision of new surface plate for shops.
	Provision of 2 dozen oil pumps.
	36 70-gallon oil tanks.
	240 pin shackles from $\frac{1}{2}$ -inch to $\frac{7}{8}$ -inch.
	30 250-lb. ball weights.
	3 1,000-lb. serrated cast-iron anchors.
	3 2,500-lb. serrated cast-iron anchors.
	7 3,500-lb. serrated cast-iron anchors.
	3 4,000-lb. serrated cast-iron anchors.
	4 4,500-lb. serrated cast-iron anchors.
	3 5,000-lb. serrated cast-iron anchors.
	Swivels and shackles for buoys.
	120 fathoms 1-inch chain.
	275 fathoms $1\frac{1}{4}$ -inch chain.
	Tube for bell buoy float.
	Completion of construction of wharf between Borland's wharf and Henry's wharf.
Riviere a la Martre.. .. .	Repairs to roof of shed, etc.
Sandy Beach.. .. .	Repairs to pier.
Seven islands.. .. .	Set of single flash reflectors 35 m/m oil vapour burner.
Southwest point	Repairs to tower and construction of new dwelling.
Table head.. .. .	Repairs to floor of fog alarm building, etc.
Upper Traverse pier.. .. .	Repairs to foundation.

MONTREAL DISTRICT

Changes and improvements in existing aids, also miscellaneous items of construction, repairs and replacements at the following places:—

Dixie	Repairs to front light pier protection.
Lake St. Peter.. .. .	Repairs to ice-breaker front.
Laperle traverse.. .. .	Two Piper lanterns.
L'Orignal.. .. .	Construction of bracket and provision of lens.
Montreal.. .. .	9 10,000-lb. concrete anchors.

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MONTREAL DISTRICT—*Concluded*

Montreal..	15 8,000-lb. concrete anchors.
	8 5,000-lb. concrete anchors.
	35 2,000-lb. concrete anchors.
	490 cast-iron ball weights.
	12 5,600-lb cast-steel anchors.
	Replacing tubes in boiler of scow <i>Quebec</i> .
	Shackles and swivels for buoys.
	Repairs to scows.
	110 Special shackles.
	7,500 ft. $\frac{3}{4}$ -inch. galvanized flexible steel wire.
	Transforming 52 gas tanks into oil storage tanks.
	Buoy materials.
	11 5,500-lb. cast-steel stockless anchors.
	6 L-200 lanterns and accessories.
	15 550-lb. lanterns and accessories.
	6 AW 300 accumulators.
Mousseau..	2 headlight lanterns.
Papineauville..	2 pressed lens lanterns.
St. Ours locks..	Pressed lens lantern.
St. Antoine (Church point)..	Pressed lens lantern.
Sorel..	186 red cedar poles.
Vaudreuil..	Red light.
Way shoal..	2 pressed lens lanterns.

ONTARIO, INCLUDING NORTHWEST TERRITORIES

NEW AIDS TO NAVIGATION

Icelandic river (Manitoba)...	Erection of range beacons and placing of buoys.
Port Arthur..	Establishment of an Aga light at the north entrance.
Trowbridge island..	Construction of a reinforced concrete tower, fog alarm building, dwelling, oil shed, boathouse, etc. Work not completed.

Changes and improvements in existing aids, also miscellaneous items of construction, repairs, and replacements at the following places:—

Amherstburg..	Installation of water service at depot.
	Repairs to scow <i>Parry Sound</i> .
	Repairs to bridge at depot.
	Repairs to wharf.
	Waling renewed.
	Repairs and improvements at depot.
	Installation of engine, derrick house, etc., on scow <i>Amherstburg</i> .
Northwest Territories.. . . .	Construction of range lights, placing of buoys, beacons, etc. on Athabaska, Slave and Mackenzie rivers.
Belleville..	Repairs to pier.
Bois Blanc..	Light changed to an unwatched light, using the Aga system.
Brighton..	Repairs to piers Nos. 1, 2 and 3, and re-erection of front range pole light.
Chippawa..	Improvement to light.
Collingwood..	Repairs to lighthouse.
Coppermine point..	Light changed to an unwatched light, using the Aga system.
Cutler..	Installation of 12-inch reflector and red glass.
Fox island..	Provision and installation of 6th order 360° lens and duplex lamp.
Grenadier island..	Installation of occulting white acetylene light.
Gros Cap lightship..	Refitting of vessel and machinery repaired and overhauled.
Leamington..	Lighting system changed to electricity.
Limekiln Crossing..	Repairs to walk leading from pier to shore.
Niagara-on-the-Lake..	Lighting system in range lights changed to electricity.
Ottawa.....	Purchase of 60 dished heads for buoys.
Parry Sound..	200 ft. $\frac{1}{2}$ -inch black chain.
	500 ft. $\frac{3}{8}$ -inch galvanized chain.
	Repairs to buffers at wharf.

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ONTARIO, INCLUDING NORTHWEST TERRITORIES—*Concluded*NEW AIDS TO NAVIGATION—*Concluded*

Parry Sound.. . . .	.120 fathoms each of 1-inch and 1¼-inch chain. 2 superstructures for bell buoys. 12 200-lb. concrete anchors.
Pointe la Barbe.. . . .	Piper lantern.
Port Dalhousie.. . . .	Installation of reflector with oil lamp.
Port Dover.. . . .	Electrification of lights and changing to red.
Prescott.. . . .	4 AW-300 Aga accumulators. 4 L-200 Aga lanterns with accessories. 1 whistling buoy superstructure. Painting and overhauling launch <i>Marafiscan</i> . 6 gas and bell buoy superstructures. 2 gas and whistling buoy superstructures, etc. 18 gas buoy superstructures. Caulking scow. 30 fathoms 1½-inch middle link chain. Fog alarm testing plant. Testing electric bulbs. 6 2,500-lb. concrete anchors. 6 5,000-lb. concrete anchors. Repairs to diving dress.
Red Rock.. . . .	Construction of a boat landing.
Selkirk, Manitoba.. . . .	Removing and replacing poles.
Southeast shoal (lightship)..	Installation of electric cluster lights.
Shaganash.. . . .	Construction of a wooden tower and dwelling.
Stag island.. . . .	Repairs to pier.
Telfer island.. . . .	8-inch pressed lens lantern.
Thames river.. . . .	Repairs to front tower.
Toronto East Gap.. . . .	Repairs to fog bell foundation.
Whitby.. . . .	Installation of an Aga light.

BRITISH COLUMBIA (VICTORIA AGENCY)

NEW AIDS TO NAVIGATION

Chief Rock	Erection of a day beacon.
Gallows point.. . . .	Installation of an electric light.
Changes and improvements in existing aids, also miscellaneous items of construction, repairs, and replacements at the following places:—	
Cape Beale.. . . .	Tramway repairs and installation of type "F" diaphone.
Discovery island.. . . .	Construction of a boathouse, repairs to verandah, sidewalk, and reshingling of oil shed.
Fraser river.. . . .	Erection of Aga beacon at North Arm, replacing one destroyed.
Kootenay.. . . .	New post in concrete block.
Kootenay lake.. . . .	Aga lighting system installed in the following places: Har- rops, Twelve-mile point, Nine-mile point, Seven-mile point, Five-mile point and Roberts point.
Lennard island.. . . .	Installation of type "F" diaphone.
Pachena point.. . . .	Repairs to dwelling.
Quatsino.. . . .	Erection of fog alarm building and erection of machinery.
Victoria.. . . .	24 200-lb. cast-iron counterweights for buoys. 24 300-lb. cast-iron counterweights for buoys. 3 400-lb. cast-iron counterweights for buoys. 24 Spar buoys. 150 fathoms 1½-inch middle link chain. 9 cedar platform buoys. Depot buildings repainted. Repairs to Marine Depot wharf. 66 main pins and forelocks. 4 6,000-lb. concrete anchors. 2 8,000-lb. concrete anchors. 100 100-gallon tanks for oil storage. 10 600-gallon tanks for oil storage.

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BRITISH COLUMBIA (PRINCE RUPERT AGENCY)

NEW AIDS TO NAVIGATION

Amur rocks.. .. .	Day beacon.
Cook point.. .. .	Installation of an unwatched light, using Aga system.
Donald point.. .. .	Installation of an unwatched light, using Aga system.
Gunboat passage.. .. .	Erection of two day beacons.
Hattie island.. .. .	Installation of an unwatched light, using Aga system.
Hyndman reefs.. .. .	Day beacon.
Juskatla inlet.. .. .	Day beacon on Mackie rock.
Law island.. .. .	Day beacon.
McKerman rock.. .. .	Installation of an unwatched light, using Aga system.
Ramsden point.. .. .	Installation of an unwatched light, using Aga system.
Salmon river flats.. .. .	Installation of an unwatched light, using Aga system.
Sloop inlet.. .. .	Erection of a day beacon.
Sunny island.. .. .	Installation of an unwatched light, using Aga system.

Changes and improvements in existing aids, also miscellaneous items of construction, repairs, and replacements at the following places:—

David point.. .. .	Fixed oil light changed to an unwatched occulting white light.
Prince Rupert.. .. .	Repairs to Departmental wharf.
	Repairs to Agent's dwelling.
	100 fathoms 1½-inch middle link chain.
	Departmental buildings repainted.
	66 Bow shackles for buoys from ¾-inch to 1½-inch.
	5 2,000-lb. concrete anchors.
	2 4,000-lb. concrete anchors.

COMMISSIONER OF LIGHTS' BRANCH

REPORT OF J. G. MACPHAIL, B.A., B.Sc., M.E.I.C., COMMISSIONER OF LIGHTS

The principal work performed during the fiscal year ended March 31, 1924, has been an extension of the buoy and beacon services, together with the maintenance of lights and other aids to navigation throughout the Dominion, and the maintenance and inspection of public wharves. The operations of this branch are set forth in tabular form in two inclosures.

INCLOSURE No. 1.—Statement, by districts, showing the number of lights of the several orders, lightships, lightkeepers, fog signals, buoys, submarine bells, etc.

	1st order lights	2nd order lights	3rd order lights	4th order lights	5th order lights	6th order lights	7th order lights	Gas beacons	Pressed lens lights and other minor types	Catoptric lights	Electric lights	Total	Lightships	Lightkeepers	Diaphanous	Fog guns and bombs
New Brunswick.....								2	2	11	6	160	1	157	25	1
Nova Scotia.....	3	3	3	32	14	20	39	3	13	45	5	185	1	169	15	1
Prince Edward Island.....	2	7	9	33	6	10	44	5	13	105	3	236		159	13	1
Quebec.....	3	1	11	20	10	18	45	6	30	93	15	252	4	198	22	4
Montreal.....				7	7	6	19	6	26	162	7	240		157		
Prescott.....				14	4	6	17	22	5	10	3	84		41	10	
Parry Sound.....		5	3	21	13	12	52	34	32	62	24	264	3	144	25	
Kenora.....							3		2	2	2	9		6		
Manitoba.....							4		1	5	1	16		10		
Victoria.....	3	1	3	7	7		10	67	3	6	19	127	1	63	20	
Prince Rupert.....	1		3	3	1		3	39	1	3		54		15	7	
Total.....	12	21	49	162	86	101	296	184	128	504	84	1,627	10	1,119	140	7

	Fog whistles	Sirens	Fog bells	Hand fog horns	Hand fog bells	Total fog signals	Fog signal stations only	Gas buoys	Gas and whistling buoys	Gas and bell buoys	Whistling buoys	Bell buoys	Total gas and signal buoys	Lightship sub-marine bells	Lighted spar buoys, floats and dolphins	Unlighted buoys	Stakes, bushes and balises	Unlighted tripods, floats, dolphins, spindles and beacons
New Brunswick.....	1		10	22			6	3	13	3	7	30	56	1		566	508	59
Nova Scotia.....	1		2	46			2	6	20	13	18	43	100	1		1,050	13	9
Prince Edward Island.....		1		9				3	4	5	3	12	27			899	1,674	6
Quebec.....	4			22			1	63		8		2	73	3	1	270	100	41
Montreal.....								105					105		3	577	170	128
Prescott.....			4	5				37		1		1	39		1	548		5
Parry Sound.....	3		4	31				37	4	11		3	55	1	29	562	76	58
Kenora.....																439		
Manitoba.....				4												67		
Victoria.....			12	4					5		2	4	18		15	181		99
Prince Rupert.....			3	4			2	2	7	2			11			34		31
Total.....	9	1	35	147	4	343	12	259	53	47	30	95	484	7	49	5,193	2,541	436

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INCLOSURE No. 2.—Statement, by localities, giving the number of unlighted buoys, stakes, bushes, balises, tripods, floats, dolphins, spindles and beacons maintained throughout the Dominion during the fiscal year ended March 31, 1924.

NEW BRUNSWICK DISTRICT

Locality and Number of Stakes, Bushes, etc.	Number of Buoys	Locality and Number of Stakes, Bushes, etc.	Number of Buoys
Advocate harbour, N.S.....	8	Letite, 1 spindle.....	
Alma, Little Salmon river, N.B.....	3	Letite, L'Etang and Bliss Harbour, N.B.....	14
Apple river, N.S.....	8	Little Wood island.....	1
Argyle river and sound, N.S.....	10	Lorneville, N.B., 1 spindle.....	1
Avon river, N.S.....	4	Magaguadavic, N.B.....	13
Bear river, N.S.....	7	Man O'War rock, L'Etang harbour, N.B.....	2
Beaver Harbour, N.B.....	4	Maquapit and French lakes, N.B., 57 stakes.....	13
Big Duck island, Grand Manan.....	1	Mink island, L'Etang harbour, N.B.....	1
Blacks harbour, N.B.....	3	Musquash, N.B.....	7
Bliss island, N.B.....	1	Old Man rock, N.S.....	1
Blonde rock, N.S.....	1	Old Woman rock, N.S.....	1
Brier island, N.S.....	1	Owls head, N.S.....	1
Buck rock, Grand Manan.....	1	Ox head ledges, N.B.....	3
Calf island bay, N.S.....	5	Parrsboro, N.S.....	6
Campobello, N.B.....	10	Pea point, L'Etang harbour, N.B.....	1
Chambers rock, N.B.....	1	Pease island, N.S.....	1
Chamcook harbour entrance, N.B.....	1	Ferry point, Kennebecasis river, N.B., 12 bushes.....	
Chance harbour, N.B.....	3	Petitcodiac river.....	12
Chebogue, N.S.....	1	Pubnico, N.S., 4 stakes.....	17
Clark harbour, N.S.....	18	Quaco, N.B.....	1
Cockerwitt pass and Woods harbour, N.S., 1 spindle.....	17	Roaring Bull rock, N.S.....	1
Cumberland basin, N.S.....	1	Robinsons ball station, Wood harbour, N.S.....	2
Deadmans head, L'Etang harbour, N.B.....	1	St. Andrews, N.B., 3 stakes.....	15
Deer island, N.B., 12 spindles in the vicinity of island.....		St. Croix river, N.B.....	9
Digby and Annapolis, N.S.....	15	St. John harbour, N.B.....	3
Digdequash, N.B.....	6	St. John river, N.B., 150 stakes and bushes.....	86
Dipper harbour, N.B.....	5	Salmon river, N.B., bushing.....	15
Dochet island, St. Croix river.....	1	Schooner rock, N.S.....	1
Freeport, N.S., 1 beacon.....	3	Scotchtown, N.B.....	16
Goose bay, N.S., 35 stakes.....	8	Shag Harbour, N.S.....	17
Grand lake, N.B., bushes.....	33	Shampiers wharf, N.B., 15 stakes.....	2
Grand Manan, bay of Fundy, 2 spindles, 1 beacon.....	18	Shulee, N.S.....	8
Grand passage, N.S., 2 spindles.....	5	Stay point, Lepreau river.....	1
Grassy island, St. John river, 18 stakes.....	7	Tusket river, N.S.....	9
Grindstone island bar.....	1	Tusket Wedge, N.S., 3 spindles.....	17
Gull ledge, N.S.....	1	Tynemouth creek, N.B.....	4
Hatfield point, St. John river, 60 bushed stakes.....	1	Walton harbour, N.S.....	1
Indian point bar channel, Grand lake, 10 bushed stakes.....	3	Washadamoak lake, N.B., 144 bushes..	2
Johns ledge, N.S.....	1	West isles, N.B., 4 spindles.....	23
L'Etang, N.B., 1 spindle.....		Weymouth, N.S.....	19
		Yarmouth, N.S., 30 dolphins.....	11

NOVA SCOTIA DISTRICT

Arichat, West Arichat and Janvrin, C.B.....	20	Canso and St. Andrews passage, N.S., 20 winter buoys.....	32
Baleine harbour, N.S.....	5	Canso harbour entrance, N.S.....	3
Barrington, N.B., 7 dolphins.....	45	Cape Negro and Northeast harbour, N.S.....	17
Beaver harbour, N.S.....	12	Chester and Gold river, N.S.....	28
Beaver island, Nova Scotia, southeast coast.....	1	Christmas island and Barra strait, C.B.....	11
Beaver narrows, C.B.....	2	Clyde river, N.S.....	5
Big Lorraine (Lorembec harbour), C.B.....	3	Coddle harbour, N.S.....	6
Birchtown, N.S.....	5	Cooks Cove (Toby Cove), N.S.....	4
Black rock shoal, off Dover, N.S.....	1	Country harbour, N.S.....	2
Blandford, N.S.....	5	Crow harbour, N.S.....	3
Boulaceet, Gillies point, C.B.....	1	Denny river, C.B.....	3

INCLOSURE No. 2.—Statment, by localities, of unlighted buoys, etc.—Continued.

NOVA SCOTIA DISTRICT—Concluded

Locality and number of Stakes, Bushes, etc.	Number of Buoys	Locality and Number of Stakes, Bushes, etc.	Number of Buoys
Descousse and Lennox passage, C.B., 5 winter buoys.....	29	Orpheus, off Green island, N.S.....	1
Devereux shoal, off Betty island, N.S.	1	Pennant harbour, N.S.....	10
Dover, N.S.....	7	Petitdegrat, C.B., 6 winter buoys.....	20
Dover harbour entrance, Gannet shoal, N.S.....	1	Petpeswick inlet, N.S.....	1
East bay, Bras d'Or, C.B.....	5	Pollock shoal, off West Ironbound island, N.S.....	1
East Chezzetcook and Petpeswick.....	10	Pope harbour, N.S.....	4
East Dover, N.S.....	7	Port Bickerton, N.S., 3 winter buoys..	5
Eskasoni, C.B.....	6	Port Felix, N.S., 2 staffs.....	10
Fourchu harbour, C.B.....	15	Port Latour, N.S., 1 spindle.....	16
Gegoggin, N.S.....	7	Port L'Hebert, N.S.....	8
Glace bay, C.B.....	6	Port Medway, N.S.....	6
Great Bras d'Or, C.B.....	7	Port Morien, C.B.....	1
Guysborough, N.S.....	5	Port Mouton, N.S.....	9
Habitants bay, C.B.....	4	Pringle harbour, C.B.....	6
Halifax, N.S.....	19	Prospect, Lower, N.S.....	10
Harrigan Cove, N.S.....	3	Prospect, Upper, N.S.....	4
Hautfond shoal, off cape Hogan, C.B..	1	Ram rock, Jordan bay, N.S.....	1
Indian harbour, N.S.....	4	River Bourgeois, C.B.....	6
Ingonish, South bay, C.B.....	9	Rose Bay, lower, N.S.....	6
Isaac harbour, N.S., 9 winter buoys...	13	Roseway, N.S.....	5
Jeddore, N.S., winter buoys.....	11	St. Ann, C.B.....	12
Johnson harbour, C.B.....	5	St. Margaret bay, N.S.....	6
Ketch harbour, N.S.....	6	St. Mary river, N.S., winter buoys.....	11
Kieley Cove, Blind bay, N.S.....	4	St. Mary river to Sherbrooke, N.S.....	18
Lahave river entrance and Crooked channel.....	12	St. Peter bay, C.B., 4 winter buoys....	17
Lahave river, between Bridgewater and Dayspring.....	6	St. Peter inlet, C.B.....	12
L'Ardoise, C.B.....	5	Sambro, N.S.....	29
Larry river, N.S., 7 stakes.....	3	Shad bay, N.S.....	4
Liscomb, N.S., winter spars.....	7	Shag bay, N.S.....	9
Little Bras d'Or harbour, C.B.....	18	Sheet harbour, N.S., 5 winter buoys...	10
Little Dover, N.S.....	9	Shelburne, N.S., 3 winter spars.....	5
Little Liscomb harbour, N.S.....	4	Shenacadie harbour, N.S.....	2
Little Lorembec (Little Lorraine), C.B.	5	Ship Harbour, Lower, N.S., 6 winter buoys.....	11
Little Narrows, C.B.....	10	Ship rock, strait of Canso.....	1
Liverpool, N.S.....	10	Slaughenwhite ledge, Hubbard Cove, N.S.....	1
Lockeport, N.S.....	18	Sober island to Ecum Secum, N.S.....	22
Louisburg, C.B., 6 winter buoys.....	8	Soldiers Cove, N.S.....	2
Lunenburg, N.S.....	8	Spry Bay, N.S.....	4
Lunenburg, Back cove, N.S.....	9	Stoney island, Baddeck, C.B.....	1
Lunenburg, middle south, N.S., 6 winter buoys.....	16	Sydney harbour, C.B.....	8
Mahone bay, N.S., 1 beacon.....	12	Tancook island, N.S.....	3
Mainadieu, C.B.....	5	Tangier, N.S.....	7
Marble Mountain, C.B.....	5	Terence bay, N.S.....	3
Marie Joseph and Ecum Secum, N.S., 11 winter buoys.....	16	Three Fathom harbour, N.S.....	5
Martins Brook, N.S.....	6	Three Island cove, N.S.....	7
McKinnon harbour, C.B.....	10	Tor bay, N.S.....	21
McNab cove, C.B.....	2	Voglers cove, N.S.....	6
McVarish shoal and Campbell point, Bras d'Or, C.B.....	4	Walkerville, C.B. (Inhabitants harbour)	3
Monsillier passage, C.B., 4 stakes.....	6	Washaback river, C.B.....	7
Musquodoboit, N.S.....	15	Webbers cove, Tor bay, N.S.....	4
New Harbour, N.S.....	1	West bay, C.B.....	5
Orangedale, C.B.....	3	West bay, C.B. (Smith island).....	1
		West Chezzetcook, N.S.....	7
		West Dublin, N.S.....	12
		Whitehaven, N.S., 5 winter buoys.....	9
		Whycocomagh, C.B.....	4

PRINCE EDWARD ISLAND DISTRICT

Aldouane, N.B., 42 bushes.....	5	Bay Fortune, P.E.I.....	3
Amherst harbour, Magdalen islands...	8	Beach point, P.E.I.....	3
Baie du Vin, Huckleberry gully and channel, N.B., 44 stakes and bushes..	20	Belle river, P.E.I.....	3
Baie Verte and Port Elgin, N.B., 30 stakes.....	6	Black brook, Miramichi river,.....	3
Bartibog and Black rivers, N.B., 12 bushes.....	1	Black Lands gully, N.B., 75 bushes....	6
		Brae harbour, P.E.I.....	5
		Brudenell river, P.E.I.....	5
		Brule, N.S.....	9

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INCLOSURE No. 2.—Statement, by localities, of unlighted buoys, etc.—*Continued.*PRINCE EDWARD ISLAND DISTRICT—*Concluded*

Locality and Number of Stakes, Bushes, etc.	Number of Buoys	Locality and Number of Stakes, Bushes, etc.	Number of Buoys
Buctouche, N.B., 34 stakes.....	22	Neguac, N.B.....	19
Buctouche river, N.B., 260 bushes...		New London-French river, P.E.I., 15 stakes.....	8
Cape Jack ledges, N.S.....	1	Northport, N.S.....	12
Cape Tormentine.....	2	North river, P.E.I., 14 stakes.....	3
Cardigan, Lower, P.E.I., 2 winter buoys	7	Orwell and Vernon rivers, P.E.I., 36 bushes, 4 beacons.....	3
Cardigan, Upper, P.E.I.....	20	Pictou, N.S.....	11
Caribou, N.S.....	6	Pictou harbour (East river), N.S., 53 bushes.....	
Cascumpeque, P.E.I., 14 stakes.....	15	Pinette, P.E.I., 24 bushes.....	5
Charlottetown, P.E.I.....	9	Pokemouche, N.B., bushes.....	6
Cheticamp, N.S.....	14	Port Borden.....	3
Chimney Corner, C.B.....	3	Port Hill, P.E.I.....	12
Church rock, Magdalen islands.....	1	Port Hood, C.B., 2 winter buoys.....	3
Cocagne, N.B., 30 stakes.....	11	Pownall, P.E.I., 10 poles.....	9
Covehead, P.E.I.....	3	Pugwash, N.S.....	8
Crapaud, P.E.I., number of stakes.....	11	Richibucto, N.B.....	38
East river, P.E.I., 15 stakes, 8 bushes..	14	Richibucto (McBeath channel), 20 bushes, 35 stakes.....	
Egmont bay, north, P.E.I., 19 stakes..	9	Richibucto river, Rexton & Brown's yard, N.B.....	30
Egmont bay, south, P.E.I., 13 stakes..	3	Rifleman reef, P.E.I.....	3
Entry island and Amherst island passage (Magdalen islands).....	6	River John, N.S., stakes.....	1
Georgetown and St. Mary's bay, P.E.I., 3 winter spars.....	19	River Phillip, N.S.....	6
Goose and Palmer harbours, P.E.I.....	5	Rollo bay, P.E.I.....	3
Grand entry, Magdalen islands.....	16	Rustico, P.E.I., 30 bushed stakes.....	6
Grand Etang, C.B.....	4	St. Charles river (Aldouane river), N.B., 60 bushes.....	
Grandigue, N.B., 30 stakes, 20 bushes..	2	St. Louis, N.B., 70 bushes.....	10
Grand river (Boughton river), P.E.I., 80 bushed stakes, 1 beacon.....	12	St. Louis river, N.B., 54 bushes and stakes.....	
Grand river, off Cape Sixteen, Malpeque bay, P.E.I.....	8	St. Peter harbour, P.E.I., 6 stakes.....	5
Grand Tracadie, P.E.I.....	4	Sandy Hook, Magdalen islands.....	1
Great Shemogue, N.B.....	9	Savage harbour, P.E.I.....	2
Grindstone reef, Magdalen islands.....	1	Shediac, N.B., 5 winter buoys.....	14
Harbour au Bouche, N.S., 6 stakes.....	4	Shippigan, N.B., 27 pickets, 30 bushes, 1 beacon.....	26
House harbour, Magdalen islands.....	12	Souris, P.E.I.....	4
Judique, C.B.....	1	Stanley and Bayfield channel, South- west river, Clifton bridge, P.E.I., 14 stakes.....	9
Kouchibouguac gully, N.B., 75 bushes..	9	Summerside, P.E.I., 10 stakes.....	10
Little channel, P.E.I.....	3	Tabusintac, N.B.....	20
Little Shemogue, N.B., 2 poles.....	5	Tatamagouche, N.S., 46 bushed stakes..	18
Mabou, C.B., stakes.....	20	Terras shoal, P.E.I.....	1
Malpeque and Darnley, P.E.I., 5 stakes	22	Tidnish, N.S., stakes.....	7
Margaree harbour, C.B., 7 stakes.....	3	Tracadie, north gully, N.B., 100 bushes and stakes.....	12
Merigomish, N.S., stakes and bushes...	6	Tracadie, south gully, N.B., 30 bushes..	5
Meule rock, Magdalen islands.....	2	Wallace, N.S., 33 stakes.....	11
Miminegash, P.E.I.....	6	West Point, P.E.I.....	4
Miramichi bay and river, 12 bushes, 12 winter spars.....	44	West river, P.E.I., 65 stakes.....	8
Miramichi bay, Grandoon channel.....	20	Wood island, P.E.I.....	4
Miramichi river, northwest branch.....	14		
Miramichi river, southwest branch.....	9		
Miscouche, P.E.I.....	1		
Montague river, P.E.I., 10 stakes.....	7		
Murray harbour and rivers, P.E.I., 25 stakes, 1 winter spar.....	32		
Napan river, N.B., 24 bushes.....	3		

QUEBEC DISTRICT

Anse a Beaufile, P.Q.....	1	Cape d'Espoir, P.Q.....	1
Anse aux Gascons, P.Q.....	1	Caraquet, N.B.....	16
Barachois de Malbaie, P.Q.....	1	Caraquet to Mizonette, N.B.....	3
Bathurst, N.B.....	31	Carleton point, P.Q.....	1
Beaudry shoal, Gaspé basin, P.Q.....	1	Echourie rock (Serpent reef), P.Q.....	1
Beauport, P.Q.....	3	Fox river, P.Q.....	1
Bersimis, P.Q.....	3	Grand Anse, N.B.....	4
Bonaventure, P.Q.....	7	Gros-cap-aux-Os, P.Q.....	1
Cape Chat, P.Q.....	1	Little River East, P.Q.....	1
Cape Cove, P.Q.....	1	Little Shippigan (Miscou gully), N.B....	4

QUEBEC DISTRICT—*Concluded*

Locality and Number of Stakes, Bushes, etc.	Number of Buoys	Locality and Number of Stakes, Bushes, etc.	Number of Buoys
Maria, P.Q.....	2	Restigouche river and Chaleur bay.....	22
Matane, P.Q.....	2	River St. Lawrence, North channel, Orleans island.....	13
Miscou, N.B.....	8	River St. Lawrence ship channel, 33 beacons, 8 spindles, 7 steel winter spar buoys.....	30
Mistassini river, 50 balises.....	13	Roberval.....	6
Moisie river, P.Q.....	3	Ste. Anne river, P.Q.....	1
Natashkwan, P.Q.....	4	St. Godfroy, P.Q.....	1
New Richmond, P.Q.....	3	St. Michel de Bellechasse, P.Q.....	4
Nouvelle Roads, P.Q.....	2	St. Simon bay, N.B., 15 stakes.....	6
Paspebiac, P.Q.....	1	St. Thomas de Montmagny, P.Q.....	8
Percé, P.Q.....	2	Saguenay river, vicinity of Chicoutimi, P.Q.....	33
Peribonka river, 35 balises.....	8	Saguenay river, Ha Ha bay.....	3
Petit Rocher, N.B.....	1		
Point St. Peter, P.Q.....	1		
Port Daniel, P.Q.....	1		
Portneuf-en-bas, P.Q.....	9		

MONTREAL DISTRICT

Ottawa river district.....	81	St. Maurice river, Grandes Piles to La- tuque, P.Q., 106 day beacons.....	74
Richelieu rapids, bushes.....		Yamachiche river, P.Q., 30 balises, 4 day beacons.....	
Richelieu river.....	66	Yamaska river, P.Q., 60 balises, 6 day beacons.....	
River St. Lawrence.....	345		
Rivière des Prairies, P.Q.....	11		
St. Francis river, P.Q., 80 balises, 12 day beacons.....			

PRESCOTT DISTRICT

Bay of Quinte.....	17	Lake St. Francis.....	29
Cataraqui river.....	3	Murray canal and Presqu'île bay... ..	25
Kingston.....	9	Napanee river.....	17
Lake Ontario, Melville shoal.....	1	Picton harbour.....	6
“ Northeast of Snake island.....	1	River St. Lawrence, 5 beacons.....	89
“ Southeast end of Snake island shoal.....	1	Telegraph Narrows.....	10
“ Southwest end of Snake island shoal.....	1	Trent canal (maintained for this De- partment by Department of Rail- ways and Canals).....	317
“ Off Long point, Wolfe Is- land.....	1	Trenton harbour.....	15
“ East of Presqu'île light.....	1	Whitby.....	5

PARRY SOUND DISTRICT

Ann Long bank, Georgian bay.....	1	Killarney harbour, Georgian bay.....	3
Bar point, Georgian bay.....	1	Lake Couchiching and narrows, 11 bushes.....	8
Bad Neighbour shoal, entrance to Georgian bay.....	1	Lake Simcoe.....	5
Bernard rock, Georgian bay.....	1	Lake Timiskaming, North Timiskam- ing, 20 stakes....	
Blind river, north channel, lake Huron.....	6	“ Ville Marie channel.....	7
Burke shoal, lake Superior.....	1	“ Wabi creek, 5 stakes.....	
Byng inlet channel, Georgian bay, 6 beacons.....	31	Lionshead harbour, Georgian bay.....	1
Campbell rock, Georgian bay.....	1	Little Current, North channel, lake Huron.....	32
Cape Hurd, lake Huron, 2 day beacons.....	3	Mary Ward ledges, Georgian bay.....	4
Clapperton channel, North channel, lake Huron, 1 beacon.....	8	Meaford harbour, Georgian bay.....	3
Cloud bay, lake Superior... ..	2	Michipicoten island (Quebec harbour), lake Superior.....	6
Collingwood, Georgian bay.....	19	Midland and Victoria harbours, Geor- gian bay.....	5
Dawson rock, Georgian bay.....	1	Morden rock, Georgian bay.....	1
Detroit river.....	30	Mutton island, lake Superior.....	1
Fort William, lake Superior.....	13	Northeast shingle, Georgian bay.....	1
Goderich, lake Huron.....	7	Ottawa river, above Pembroke, Ont....	30
Jackson shoal, Georgian bay.....	2	Owen Sound channel, Georgian bay.....	4
Kennedy bank, Georgian bay.....	1	Parry Sound ship channel, 2 beacons...	20
Key harbour channel, Georgian bay, 6 beacons.....	24		

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PARRY SOUND DISTRICT—*Concluded*

Locality and Number of Stakes, Bushes, etc.	Number of Buoys	Locality and Number of Stakes, Bushes, etc.	Number of Buoys
Parry Sound to Waubaushene, Georgian bay inner channel.....	116	St. Joseph channel, lake Huron, 1 beacon, 5 winter buoys.....	25
Penetanguishene, Georgian bay.....	12	Shebeshekong channel, Georgian bay, 22 day beacons.....	7
Pointe au Baril and Kennedy shoal, Georgian bay, 15 beacons.....	3	Southampton, lake Huron.....	4
Port Arthur, lake Superior.....	25	South Baymouth, lake Huron.....	6
Port McNicoll, Georgian bay.....	2	Stokes bay, lake Huron.....	16
Port Rowan, lake Erie.....	10	Sturgeon river, Monetteville and Cache bay, 28 bushed stakes.....	3
River St. Clair, chenel Ecarte.....	1	Sutton river, 12 bushed stakes.....	5
“ middle ground.....	1	Victoria island, lake Superior.....	4
River St. Mary and east end of lake Superior.....	21	Wabuno channel, Georgian bay, 3 beacons.....	
River Thames, lake St. Clair.....	7	Wingfield basin, Georgian bay.....	
Rondeau, lake Erie.....	6		

KENORA DISTRICT

Lake of the Woods.....	345	Wabigoon lake.....	22
Rainy lake.....	27	Winnipeg river, White Dog to Kenora..	24
Shoal lake.....	21		

MANITOBA DISTRICT

Black river, lake Winnipeg.....	6	Red river.....	17
Icelandic river, lake Winnipeg.....	7	Warrens landing, lake Winnipeg.....	12
Lake Winnipegosis, entrance Pine creek.....	7		
Lake Winnipegosis and mouth of Mossy river.....	18		

VICTORIA DISTRICT

Active pass, 1 beacon.....		Mud bay, Serpentine and Nicomeck'l rivers, 3 beacons, 27 dolphins.....	
Alberni canal.....	1	Nanaimo harbour and Departure bay, 1 beacon.....	15
Arrow lakes, 2 beacons.....	21	Nanoose harbour.....	1
Baynes sound and approaches, 1 beacon.....	10	Navy channel, Conconi reef.....	1
Broughton strait.....	1	Okissolla channel, 3 beacons.....	2
Browning passage, 1 beacon.....		Pender island canal.....	2
Burrard islet and Vancouver harbour, 7 beacons.....	7	Pitt river.....	9
Clayoquot sound, 3 beacons.....	12	Prevost passage.....	1
Colburne passage, Colburne channel.....	2	Quatsino sound, 2 beacons.....	2
Courtenay river, 12 pile dolphins.....	3	Richard rock, Barkley sound, 1 beacon.....	2
Cowichan harbour.....	1	Saanich inlet, 1 spindle, 1 beacon.....	1
Esquimalt harbour, 2 beacons.....	3	Satellite channel, 2 beacons.....	1
False narrows.....	2	Scott point, Captain pass.....	1
Fraser river.....	38	Shoal passage, Howe sound.....	2
Ganges harbour.....	2	Shushartie bay, 1 beacon.....	1
Georgia strait, 2 beacons, 1 set range day marks.....	7	Shute passage.....	6
Haro strait, 1 beacon.....	2	Sidney channel, 1 beacon.....	4
Houston passage.....	1	Stuart channel and approaches, 4 beacons, 1 pile dolphin.....	2
Johnstone strait, 4 beacons.....	2	Sutil channel, 1 pile dolphin.....	3
Juan de Fuca strait.....	1	Trincomali channel and Porlier pass, 5 beacons.....	1
Kootenay lake, northwest arm.....	7	Ucluelet harbour, 1 beacon.....	
Kyuquot sound, 1 beacon.....	1	Victoria harbour, 2 beacons.....	
Liddell point, Swanson channel.....	1		
Malaspina strait, 3 beacons.....	2		

PRINCE RUPERT DISTRICT

Chatham sound, 1 beacon.....	7	Prince Rupert harbour, 1 beacon.....	2
Fitzhugh sound, 1 beacon.....	1	Queen Charlotte islands, 6 beacons.....	1
Grenville channel, 3 beacons.....	1	Return channel, 1 beacon.....	1
Lama passage, 3 beacons.....		Seaforth channel, 5 beacons.....	2
Metlakatla.....	9	Seaforth and Spiller channels, Hyndman reef, 1 beacon.....	
Observatory inlet, 3 beacons.....	3	Skeena river and passages, 5 beacons...	
Porpoise harbour.....	6	Tolmie channel, 1 beacon.....	
Port Simpson.....	1		

RIVER ST. LAWRENCE SHIP CHANNEL

REPORT OF V. W. FORNERET, B.A. SC., M.E.I.C., SUPERINTENDING ENGINEER

GENERAL INFORMATION

The Ship Channel of the river St. Lawrence between Montreal and Father Point, has a total length of 350 statute miles.

The contracted part of the river, which may be properly called "Ship Channel," commences at the "Traverse," 60 miles below Quebec, which is 220 miles from Montreal by the South channel.

The uncompleted North channel below Quebec, commences at Goose cape, a distance of 226 miles from Montreal.

The completed channel has a minimum width of 450 feet and on the curves from 500 to 800 feet.

DEPTH OF WATER IN THE ST. LAWRENCE SHIP CHANNEL, SEASON 1923

The depth of water in the 30-foot channel during the season of 1923 went as low as 29 feet 9 inches by the Sorel gauge. This was due to lack of precipitation but mainly to the low water level in lake Ontario.

Last season the level of lake Ontario was 244.24 feet above mean sea level, which is the lowest reached since the extreme low water of 1895, when the level of lake Ontario went to 243.41 feet mean sea level. It must also be noted that during the season of 1923, there was very little easterly wind on the St. Lawrence below Montreal, which helps to back up the water to a certain extent.

With the conditions stated above and also taking into consideration the loss of level due to the diversion of water by the Chicago Drainage canal, it is not surprising that the water in the Ship channel was low during the last season.

The datum adopted for the 30-and 35-foot channels is the actual lowest water observed during the season 1897. This level was the lowest ever observed with the exception of the extraordinary low water of 1895 and 1911 and also during the season of 1923.

The following table shows the depths of water in the 30-foot channel by the Sorel gauge from 1907 to the season of 1923.

Year	Lowest water observed during season of navigation	Year	Lowest water observed during season of navigation
	Ft. In.		Ft. In.
1907.....	31 10	1916.....	30 9
1908.....	30 00	1917.....	31 3
1909.....	30 11	1918.....	31 3
1910.....	30 7	1919.....	31 3
1911.....	29 4	1920.....	30 1
1912.....	31 3	1921.....	30 1
1913.....	31 1	1922.....	30 1
1914.....	30 3	1923.....	29 9
1915.....	30 1		

Nineteen hundred and seven was the year the 30-foot channel was opened as far as Batiscan where advantage could be taken of the tide to Quebec to obtain this depth for the uncompleted 27½-foot channel below the former point.

It will be noted from the above table that with the exception of the extraordinary low water of 1911 and 1923, the water never got lower than the low water datum of 1897.

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TIDAL SEMAPHORES

The tidal semaphore at Cap à la Roche on the south shore, which shows the available depth of water in the dredged channel, was put in operation on May 7, 1923.

The tidal semaphore at pointe Citrouille on the north shore, $10\frac{1}{2}$ miles above Cap à la Roche, commenced operations on the same day.

These two stations are connected by special telephone line to enable the operator at Cap à la Roche to telephone every 3-inch rise or fall of the tide to the operator at point Citrouille, the latter shows the depth in feet by means of large figures and the inches by a small semaphore.

The semaphore at point Citrouille enables the pilots of deep draught vessels outward bound to judge if there is sufficient depth of water in the dredged channel at Cap à la Roche to allow them to pass with safety. If they consider there is not sufficient depth to pass with safety, it gives them time to stop at the anchorage below pointe Citrouille and wait for the tide to rise.

The tidal semaphore at St. Nicholas point on the south shore, which shows the depth of water available in undredged channel over St. Augustin bar, was put in operation on May 7, 1923.

The semaphore mast, which has been in use for over thirty years, was found to be in a dangerous state and past repairing. It was decided by the department to replace it by a modern steel tower, which was only completed after the season of navigation was over, but will be put in operation next season.

SWEEPING OF SHIP CHANNEL

The addition of the new sweeping scow has enabled a larger area of the Ship channel to be examined each season.

The usual annual sweeping of the Ship channel was carried on above and below Quebec, which was carefully done and no obstructions of a serious nature were found.

DREDGING OPERATIONS, SEASON 1923

The department decided to carry on the dredging operations for season of 1923 on the River St. Lawrence Ship Channel on the same scale as in 1922, which consisted of five dredges (working during daytime only) and attending plant, one rock breaker, one stone lifter, one sweeping steamer and a new sweeping scow.

Cap à la Roche Curve.—One powerful dredge capable of working in rock, one rock breaker and one stone lifter was employed at Cap à la Roche during the season of 1923, deepening and widening the channel.

The widening is nearing completion, and what remains to be deepened will only permit one dredge to be operated in this channel, owing to limited space.

The channel at Cap à la Roche is being deepened from $27\frac{1}{2}$ feet at ordinary low water (old datum) to 30 feet at extreme low water of 1897 (new datum). The new low water datum of 1897 is 2 feet lower than the old datum, so that the channel has to be dredged to $4\frac{1}{2}$ feet deeper.

Notwithstanding the hard nature of the material to be removed, being solid shale rock, loss of time due to tides and passing vessels, good progress was made.

The total number of cubic yards dredged during the season of 1923 amounted to 53,375, at a total cost of \$61,355.06 or \$1.14⁹⁵/₁₀₀ cents per cubic yard.

Cap Charles Channel.—After the work of dredging this channel from 27½ feet at ordinary low water to 30 feet extreme low water of 1897 was completed,

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the whole of the channel was carefully swept by the sweeping steamer and a considerable number of boulders and stones were found to have been left by the dredges. These have now all been lifted with a stone lifter and the channel was proved clear to 30 feet at E.L.W. last season by the sweeping steamer.

Champlain Channel.—This channel was carefully swept by the sweeping steamer to 30 feet at E.L.W. as usual last season, but the sand bars which had formed since the previous season were found not to be as numerous as in previous years. These were all cleaned up by a dredge before the low water period. The amount of material dredged during the season of 1923 amounted to 51,500 cubic yards, at a total cost of \$23,405.98 or $45\frac{4}{100}$ cents per cubic yard.

Ile au Raisin Channel.—The material being very soft, the new elevator dredge No. 16 was operated here for a short time while waiting for a new driving wheel which had been ordered from England to replace one that had developed fractures when working below Quebec.

This dredge deepened the channel from 30 feet at E.L.W. to 35 feet at E.L.W.

The amount of material removed during the time the dredge worked in ile au Raisin Channel was 34,950 cubic yards, at a total cost of \$32,953.95 or $94\frac{2}{100}$ cents per cubic yard, the material being soft blue clay.

Sorel to Ile de Grace.—One dredge was operated for a short period during the season of 1923 deepening the 30-foot channel to 35 feet at E.L.W. of 1897.

The total number of cubic yards removed amounted to 9,750, at a total cost of \$6,050.33 or $62\frac{6}{100}$ cents per cubic yard, the material dredged consisting of clay.

Contrecoeur Channel.—Two powerful dredges were operated in this channel during the whole of the season of 1923, and two additional dredges for short periods.

Considerable work was done on this channel and good progress made. Another season similar to 1923 should see the completion of this channel to 35 feet at E.L.W. of 1897.

The total number of cubic yards dredged amounted to 971,900, at a total cost of \$282,827.22 or $29\frac{1}{100}$ cents per cubic yard, the material being clay.

Vercheres Traverse.—One dredge worked for a short period at the upper end of Vercheres traverse, deepening the channel to 35 feet at E.L.W. of 1897.

The total number of cubic yards removed amounted to 22,250, at a total cost of \$13,773.59 or $61\frac{9}{100}$ cents per cubic yard, the material dredged being clay.

North Channel below Quebec.—Dredge No. 16, the new sea-going elevator dredge, built by Canadian Vickers, Ltd., Montreal, worked all season in the East narrows, North channel, dredging to a depth of 35 feet at extreme low tide. On July 18 the port side driving wheel was found to have developed cracks and it was considered unsafe to continue working at the East narrows owing to the nature of the material to be removed, which consisted of numerous stones and some embedded boulders. A new wheel had to be ordered from England, and in order not to have the dredge lying idle, No. 16 was laid out to work in ile au Raisin channel at the upper end of lake St. Peter, where the dredged material would be very soft, as it was soft blue clay, and not too great a strain on the cracked wheel.

On August 25, which was the end of the guarantee period, the dredge was taken to Sorel to change the lower tumbler and then went up to Canadian Vickers, Montreal, to have the port driving wheel replaced by the new one

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which had arrived from England. While this work was being done and the changing of the large mud buckets for the smaller buckets for hard material, the dredge was overhauled by the Canadian Vickers, the builders, as agreed to be done after the guarantee period had expired. The work being completed, the dredge left Sorel on October 4 to return to East narrows, North channel, below Quebec, where No. 16 worked until October 30, and then left for winter quarters. Before being laid up at Sorel, the dredge was taken to Canadian Vickers to be drydocked, have an examination of propeller and shaft made, and also have the hull scraped and painted. This work could not be done when the dredge was up before on account of floating dock not being available.

The total number of cubic yards removed amounted to 170,325, at a total cost of \$130,246.58 or 76⁴⁶/₁₀₀ cents per cubic yard.

The total number of cubic yards dredged during the season of 1923 amounted to 1,314,050, at a total cost of \$550,612.71 or 41⁹⁰/₁₀₀ cents per cubic yard.

Progress of dredging operations at the end of the season of 1923

Thirty-foot Project—

Total length of dredging done.....	66.67 miles
Total length of dredging yet to be done.....	1.38 “
Total number of cubic yards dredged.....	53,639,702
Total number of cubic yards yet to be dredged.....	1,661,631

Thirty-five-foot Project—

Total length of dredging done.....	43.79 miles
Total length of dredging yet to be done.....	45.20 “
Total number of cubic yards dredged.....	41,085,601
Total number of cubic yards yet to be dredged.....	25,775,615

The total cost from 1851 to the end of the fiscal year ending March 31, 1924, of the Ship Channel from Montreal to Father Point, including plant, shops, surveys, etc., is as follows:—

Dredging.....	\$16,876,820 10
Plant, Shops, Surveys, etc.....	8,965,935 63
Total.....	<u>\$25,842,755 73</u>

The total number of cubic yards dredged in the River St. Lawrence Ship Channel from 1851 to the end of season of 1923, amounted to 121,443,533, the material varying from very hard shale rock to soft blue clay.

ACCIDENTS IN THE ST. LAWRENCE RIVER, SEASON OF NAVIGATION, 1923

Between Montreal and Quebec

May 19.—Tug *Gerald Morgan* belonging to the Sincennes, McNaughton Line, towing canal-barge *Celina Delorme* when off Nicolet barge struck a red gas buoy and also the red gas buoy off Pointe Citrouille. Barge received damages, had to be beached at latter place. Was refloated.

June 1.—SS. *Krasfond*, Elder Dempster, Agents, inward bound, grounded upper end Contrecoeur channel, outside channel thick smoke, soft bottom. Was refloated, no damage, and proceeded up.

June 1.—SS. *Mapledawn* belonging to Canada Steamships Line, outward bound went aground on bank in thick smoke at lower end of Plum island below Vercheres. Was refloated, soft bottom, no damage, and proceeded down.

June 2.—SS. *Canadian Explorer* of the Canadian Mercantile Marine, outward bound, went aground about 1½ miles below Vercheres outside of Ship Channel on south side on account of thick smoke. She was lightened and floated off with apparently no damage and proceeded down.

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July 10.—SS. *Lingfield*, Thos. Harling and Son, Agents, outward bound, struck gas buoy 83Q, Cap Charles channel, and broke blades off propeller. Had to return to Montreal to replace broken blades.

Aug. 3.—SS. *Cairntorr*, R. Reford Company Limited, Agents, outward bound, went aground outside the channel on the north side near upper end of Plum island opposite Vercheres. Steering gear out of order. Was lightened and refloated. No damage as bottom was soft.

August 5.—SS. *Turret Cape*, Dominion Coal Company, inward bound, went aground at head of Petit traverse, Contrecoeur channel, on north bank. Steering wheel jammed. Was lightened and refloated without damage as bottom was soft.

August 7.—Steam barge *Birchbay*, Bay Steamship Lines, loaded with coal, went aground on Platon Batture, opposite red gas buoy 52Q. Vessel was total wreck.

September 7.—SS. *Bothwell*, C.P.O.S. upward bound, went aground in thick weather, for a short time on bank, but refloated without any help. No damage, as bottom very soft.

September 24.—SS. *Richelieu*, Canada Steamships Line, inward bound, went ashore in vicinity of Richelieu rapids. Dragged anchor in thick fog. Was refloated with the tide and proceeded up. Bottom damaged.

September 26.—SS. *Mincio*, outward bound, went aground in thick weather, near cap St. Michel, on north bank. Was refloated and proceeded down. No damage as bottom soft.

October 15.—Steam barge *Lehigh*, Geo. Hall Coal and Shipping Corporation, outward bound, went aground on south shore, above Batture de Belle Filles, near Batiscan traverse. Was refloated apparently undamaged and proceeded down.

November 12.—SS. *General Milne*, Thos. Harling and Son, Agents, outward bound, caught in dense fog at lower end of cap Charles channel, anchored outside channel and grounded. Ship floated itself off at high tide and proceeded to Quebec. Bottom damaged.

November 25.—SS. *Kamouraska*, Dominion Coal Company, inward bound, went aground in fog on the north side of the channel just above ile des Lauriers, cap St. Michel. Was lightened and refloated, and proceeded up to Montreal. Apparently no damage as bottom soft.

Quebec to Father Point

May 11.—SS. *Minnedosa*, C.P.O.S. outward bound was struck by schooner *Lodelius* just below Upper Traverse pier. The schooner only carried away her bowsprit.

May 15.—Steam barge *John Ruggee*, Geo. Hall Coal Company, inward bound, struck the bowsprit of schooner *G. Gagnon* off Grosse isle. Light damage.

June 20.—SS. *Kamouraska*, Dominion Coal Company, outward bound, collided with the ss. *Fanad Head*, McLean, Kennedy, agents, inward bound, above Bicquette light.

June 23.—SS. *Heathfield*, Thos. Harling, agents, outward bound, collided with schooner *Ste. Croix* in the traverse St. Roch. Schooner received damages to her bow.

July 22.—SS. *Manoa*, Canada Steamship Lines, outward bound, struck the wreck *Canadian Recruit* at Stone pillar, on the south outside of channel. Pilot took the wreck buoy for Channel Patch buoy. The steamer proceeded down. Partial damage to hull.

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August 30.—SS. *Canadian Sapper*, Canadian Government Merchant Marine, inward bound, went aground on Red Island reef in thick fog. Refloated herself apparently undamaged.

October 10.—SS. *Mapleton*, Canada Steamship Lines, inward bound, touched ground at Lark reef in thick fog; anchor dragged. Floated off and proceeded up.

November 14.—Schooner *Maria Stella*, owned by the master, Leopold Bouchard, collided with the ss. *Westerian*, outward bound, near Red Island light. The schooner was damaged.

NOTE.—None of the accidents mentioned above between Montreal and Quebec, and Quebec to Father Point, were caused by any fault in the Ship Channel.

MARINE SIGNAL SERVICE

March 31, 1924

Signal stations have been established for the purpose of maintaining communication between ship and shore by means of flag signals.

This system of stations extends from St. John, N.B.; Halifax, N.S.; Cape Race, Nfld.; and Belle Isle up the gulf and river St. Lawrence and through the Great Lakes to Port Arthur and Fort William, Ont.

Following is a complete list of stations:—

EAST OF QUEBEC

Name of Station	Location	Nautical miles from Quebec	Means of Communication
(R.)—Quebec.....	Custom House.....	0	Telephone.
(R.)—St. Jean d'Orleans.....	Shore end of wharf.....	14	"
Crane Island.....	Lighthouse.....	32	"
L'Islet.....	100 yards east of church.....	40	Telegraph.
Cape Salmon.....	Lighthouse.....	81	Telephone and telegraph.
Father Point.....	Shore end of wharf.....	157	Telegraph.
Little Metis.....	Lighthouse.....	175	"
Matane.....	".....	200	"
Pointe des Monts.....	".....	219	"
Cap Chat.....	".....	234	"
Riviere a la Martre.....	".....	260	"
Cape Magdalen.....	".....	294	"
Fame Point.....	".....	325	"
Cap des Rosiers.....	".....	349	"
Cap d'Espoir.....	".....	377	"
Point Maquereau.....	".....	400	"
West Point, Anticosti.....	".....	332	"
Southwest Point, Anticosti.....	".....	360	"
South Point, Anticosti.....	".....	415	"
Heath Point, Anticosti.....	".....	438	"
Point Escuminac, N.B.....	".....	462	Telephone.
Amherst Island, Magdalen Islands.....	".....	481	Telegraph.
St. Paul's Island, C.B.....	Main station.....	540	Wireless and telephone.
Money Point, C.B., N.S.....	Lighthouse.....	537	Telephone.
Flat Point, N.S.....	".....	575	Telegraph.
Cape Ray, Nfld.....	".....	553	"
Cape Race, Nfld.....	".....	826	"
Point Amour, Labrador.....	".....	673	Wireless and telegraph.
Belle Isle.....	".....	734	Wireless telegraph.
Chebucto Head, N.S.....	".....		Telephone.
Halifax, N.S.....	The Citadel.....		"
Point Lepreaux, N.B.....	Lighthouse.....		"
Partridge Island, N.B.....	".....		"
St. John, N.B.....	Custom House.....		"
Point Tupper, C.B.....			Telegraph.
Scatari Island, C.B.....			"

WEST OF QUEBEC

Name of Station	Location	Nautical miles from Quebec	Means of Communication
Bridge Station.....	Half mile above Quebec Bridge on south shore....	6	Telephone.
St. Nicholas	At Tidal Semaphore.....	12	"
Portneuf	In front Lighthouse.....	31	"
Grondines	In Old Windmill Tower.....	41	"
St. Jean Deschaillons	At Tidal Semaphore.....	45	"
Point Citrouille.....	In Lighthouse.....	55	"
Three Rivers.....	Upper end of Bureau wharf..	68	"
Sorel.....	Lower end of Government wharf.....	100	"
Bellmouth.....	About 500 feet east Contre-cœur Course, low light....	110	"
Cap St. Michel.....	Abreast east end Ile des Lauriers.....	125	"
Longue Pointe.....	Point between wharves.....	134	"
(R.)—Montreal.....	92 Notre Dame St. East (La Sauvegarde Building).....	139	"

WEST OF MONTREAL

Name of Station	Location	Nautical miles from Montreal	Means of Communication
(R.)—Lachine Canal.....	Lock No. 2.....	0	Telephone.
(R.)—Lachine Canal.....	Lachine.....	8	"
(R.)—Soulanges Canal.....	Cascades Point.....	21	"
(R.)—Soulanges Canal.....	Coteau Landing.....	33	"
(R.)—Cornwall Canal.....	Cornwall.....	62	"
(R.)—Galops Canal.....	Lift Lock.....	99	Telegraph.
(R.)—Welland Canal.....	Port Dalhousie.....	298	"
(R.)—Welland Canal.....	Port Colborne.....	321	"
(R.)—Soo Canal.....	Sault Ste. Marie.....	820	"

Stations marked thus (R.) are reporting stations only and are not equipped for signalling purposes.

BRIEF SUMMARY OF WORK PERFORMED

- 1. Stations report movements of vessels to Montreal, Quebec, Sydney, Halifax or St. John.
- 2. Stations report weather conditions daily to Montreal, Quebec, Sydney, Halifax or St. John.
- 3. Montreal, Quebec, and St. John publish daily bulletins giving weather and ice conditions and movements of vessels.
- 4. Montreal and Quebec publish daily bulletins showing depths of water at various points in the River St. Lawrence Ship Channel.
- 5. The Signal Service offices at Montreal, Quebec, and St. John are open day and night for the purpose of furnishing the public with information of shipping matters.
- 6. The Telegraph System of the Department of Public Works on the north shore of the gulf of St. Lawrence report the movements of vessels engaged in the coasting trade to the Signal Service at Quebec.
- 7. The Government Grain Elevator at Port Colborne reports to Montreal the arrival and departure of vessels engaged in the Upper Lakes grain trade.
- 8. The collectors of customs at Fort William and Port Arthur report to Montreal the arrival and departure of vessels engaged in the Canadian grain trade.
- 9. The collectors of customs at all the seaports in the river and gulf of St. Lawrence, on the Atlantic coast and in the bay of Fundy report the arrival and departure of vessels engaged in the overseas trade.

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10. Lloyds agent at Quebec is furnished daily with full information of the movements of vessels engaged in the overseas trade to and from ports in the province of Quebec.

11. Lloyds agent at St. John, N.B., is furnished daily with full information of the movements of vessels engaged in the overseas trade to and from ports in the Maritime Provinces.

12. The reporting station at St. John, island of Orleans, which had been closed during the war, was reopened in May, 1923, and proved of great utility, particularly to vessels using the north channel east of the island of Orleans.

13. The Camperdown, N.S., signal station was closed and the signal station moved to the lighthouse at Chebucto Head.

14. All the signal stations and masts were maintained in good order.

15. A new modern steel tower was erected at Pointe Nicholas to replace the wooden semaphore mast, which was past repairing, having been in existence over thirty years. It was completed too late to put into operation this year, but it is proposed to have it working for the season of 1924.

ICE-BREAKING, 1923-24

REPORT OF N. B. McLEAN, ENGINEER (RIVER ST. LAWRENCE SHIP CHANNEL),
ON THE WORK OF THE ICE-BREAKING STEAMERS "LADY GREY" AND
"MIKULA" DURING THE WINTER OF 1923-1924

The winter season of 1923-24 was not severe, especially the months of December and January. During these two months the ice-breakers had practically nothing to do. On December 31, an ice bridge formed above Three Rivers and by January 6, the river was covered to Montreal. From January 6, to February 7, no great difficulty was experienced, but on the latter date an ice jam formed in Quebec harbour and at Quebec bridge, and by February 27, had backed up as far as cap Madeleine, the river being blocked from the bridge to Montreal with the exception of an open space of water in front of Three Rivers.

About the end of November the *Lady Grey* went to Three Rivers as usual to render any assistance necessary to vessels in the ice, but she had nothing to do, as the river was as clear as in summer. She came down to Quebec on December 8, and took up her station there for the winter with the *Mikula*.

From December 8, until February 7, there was not much ice and consequently very little work for the ice-breakers.

On February 7, a jam occurred at the bridge and also in Quebec harbour. The *Lady Grey* was at Indian cove, prepared for just such an emergency and worked all day but did not succeed in starting the harbour ice. At 6.15 p.m. however, this ice moved up with the flood and passed out with the falling tide. The next morning she began breaking the jam at the bridge, working alone until the 10th, when she was joined by the *Mikula*, the latter vessel, the evening before, having arrived back from a trip to Ellis bay and intermediate ports. The two ice-breakers worked steadily, making good progress through heavy packed ice and frazil until February 26, when they both damaged their rudder stocks. At this date they had cut through $4\frac{1}{4}$ miles of ice varying in thickness from 30 to 60 feet, their average rate of progress being at the rate of 1,200 feet per day. A day in this case is only about seven hours, as the ice-breakers can only cut up stream with falling tide.

As the jam at the bridge was so heavy and took so long to cut out the ice above backed up and the river became covered from cap Rouge to Montreal with the exception of an open space at Three Rivers.

The accident to the rudder stock of the *Mikula* put this vessel permanently out of action for the remainder of the season. Repairs were completed to the *Lady Grey* on March 14, and on the same date she again took up the task of opening cap Rouge, working there until March 24, when she succeeded in cutting through the last of the heavy ice.

Several days previous to the date the *Lady Grey* cut through the cap Rouge jam, the ice in the upper river had been shoving, and stretches of open water had appeared at different points.

On March 25, the *Lady Grey* proceeded up river to a point 3¼ miles above St. Nicholas semaphore and began the work of clearing the river of the lighter ice which had formed above the cap Rouge jam. She worked steadily until April 11, when she cut through into open water slightly below the foot of the Richelieu rapids.

On April 12, she proceeded in open water to the foot of lake St. Peter and began clearing the lake in which she was successful by April 17, and on this date the river was open to Montreal, the *Lady Grey* proceeded as far as Sorel, and going on to Montreal on the 18th.

As has been customary for some years, the *Lady Grey* at the request of the Department of Railways and Canals, went up to the entrance to the Soulanges canal on April 23, cleared out the bank of frazil that forms there every winter, and returned to Montreal on April 24. This completed the ice-breaking for the season of 1923-24.

AVERAGE depth for each Month in the 27½ feet Channel. (27½ feet at Ordinary Low Water) From Sorel Guage each year May to November

Year	May		June		July		Aug.		Sept.		Oct.		Nov.		Highest		Lowest	
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.
1892	31	0	31	9	31	6	30	6	28	9	28	3	28	3	33	6	27	3
1893	36	0	34	3	30	9	29	9	29	6	28	6	28	0	37	6	27	6
1894	34	6	31	9	31	0	29	2	28	3	28	9	29	0	36	0	27	7
1895	33	3	31	3	28	3	28	3	27	6	26	9	26	9	34	6	25	10
1896	33	6	30	6	28	9	28	0	27	6	27	9	29	0	37	0	27	4
1897	35	6	32	6	30	3	29	3	28	0	27	0	27	6	37	0	26	4
1898	31	6	30	9	29	8	28	2	28	2	28	3	28	6	32	1	26	9
1899	36	2	31	9	30	3	28	6	27	6	28	0	27	9	37	9	26	9
1900	33	6	30	9	30	6	29	6	28	1	28	9	29	2	35	9	27	4
1901	34	3	31	10	29	2	28	3	27	7	27	4	27	3	36	3	26	6
1902	32	2	32	2	32	2	29	4	28	1	28	1	29	0	34	1	27	6
1903	33	0	30	11	30	5	29	5	28	4	29	0	27	11	32	8	26	11
1904	36	3	34	5	30	9	29	5	29	5	30	4	29	3	37	4	28	1
1905	31	10	30	8	29	7	29	0	28	0	28	5	28	1	33	6	27	1
1906	32	4	31	5	29	3	27	11	27	3	27	4	27	6	33	3	26	9

AVERAGE depth for each month in the 30-ft. Channel (30 feet at extreme Low Water of 1897)

1907	37	1	35	9	34	3	32	10	32	4	32	9	33	7	38	3	31	10
1908	41	5	37	10	33	10	32	10	32	0	31	0	30	6	42	4	30	0
1909	40	6	37	6	33	10	33	2	32	7	32	4	31	6	42	7	30	11
1910	35	7	34	5	32	3	31	7	31	6	31	6	31	7	37	1	30	7
1911	36	6	34	6	32	1	31	3	30	9	30	2	30	3	38	1	29	4
1912	37	9	37	6	33	6	32	8	32	6	32	6	34	9	40	11	31	3
1913	37	0	34	4	32	8	31	10	31	6	32	1	32	7	38	6	31	1
1914	35	2	33	0	32	4	31	4	31	3	30	11	31	0	36	10	30	3
1915	34	7	32	6	31	6	31	4	31	1	30	11	30	8	37	4	30	1
1916	38	9	37	2	34	0	32	5	31	7	31	9	31	10	40	0	30	9
1917	36	8	36	6	34	10	33	6	32	3	32	6	33	0	38	2	31	3
1918	36	1	34	1	33	10	32	0	32	3	33	7	34	11	38	1	31	3
1919	39	7	36	7	33	5	32	4	32	3	32	8	33	5	41	1	31	3
1920	35	9	33	0	32	4	31	8	31	5	31	4	31	6	37	5	30	1
1921	35	6	32	9	31	10	31	4	30	10	31	4	31	6	37	8	30	1
1922	37	1	34	9	33	4	32	3	31	7	31	4	30	11	40	5	30	1
1923	38	2	34	3	32	1	31	2	31	1	30	8	30	9	39	8	29	9

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COST OF SHIP CHANNEL TO DATE

TABLE Showing the Total Cost of the Dredging and Plant and the Quantities Dredged to March 31, 1924

	Cost of dredging	Expenditure for plant, shops, surveys, etc.	Quantities dredged
	\$ cts.	\$ cts.	cu. yds.
MONTREAL HARBOUR COMMISSIONERS, 1851 TO 1888			
Dredging Montreal to Cap à la Roche to 27½ feet. at O.L.W. and from Cap à la Roche to Quebec to 27½ ft. at half tide.....	3,402,494 35	534,809 65	• 19,865,693
DEPARTMENT OF PUBLIC WORKS			
Dredging consisting of widening and cleaning up of channel, deepening Cap à la Roche to Cap Charles to 27½ ft. at O.L.W. and dredging at Grondines, Lotbiniere and Ste. Croix, 1889 to June 30, 1899.....	839,583 08	486,971 79	3,558,735
PROJECT OF 1899			
Dredging channel between Montreal and Quebec to 30 ft. at lowest water of 1897, also widening to a minimum width of 450 ft. and straightening—			
Fiscal year 1899–1900.....	100,191 91	265,270 78	1,107,894
“ 1900–1901.....	136,680 83	287,040 04	2,479,385
“ 1901–1902.....	185,429 80	479,731 47	3,098,350
“ 1902–1903.....	255,776 55	277,703 50	6,544,605
“ 1903–1904.....	276,958 59	308,765 44	4,619,260
DEPARTMENT OF MARINE AND FISHERIES			
<i>This includes the work below Quebec</i>			
Fiscal year 1904–1905.....	311,087 93	277,225 69	2,716,220
“ 1905–1906.....	431,768 30	317,327 37	4,047,530
“ 1906–1907 (July 1, 1906 to Mar. 31, 1907).....	302,677 37	275,003 61	3,001,010
“ 1907–1908.....	478,209 66	417,390 22	4,831,875
“ 1908–1909.....	497,686 03	340,861 86	5,896,737
“ 1909–1910.....	572,950 71	321,375 80	6,354,285
“ 1910–1911.....	576,838 02	488,248 88	5,600,050
“ 1911–1912.....	588,697 60	499,799 58	4,509,904
“ 1912–1913.....	663,229 74	430,107 86	6,929,344
“ 1913–1914.....	895,235 59	426,018 12	6,140,867
“ 1914–1915.....	1,036,846 65	327,975 71	6,225,143
“ 1915–1916.....	976,622 03	771,760 03	8,462,957
“	1,030,550 60	437,469 62	7,800,555
“ 1917–1918.....	618,399 69	136,765 97	2,517,376
“ 1918–1919.....	350,152 92	79,797 45	628,060
“ 1919–1920.....	422,107 05	132,747 20	517,305
“ 1920–1921.....	446,134 85	151,422 99	715,895
“ 1921–1922.....	464,660 74	102,710 14	1,167,100
“ 1922–1923.....	465,236 80	261,152 89	793,350
“ 1923–1924.....	550,612 71	130,481 97	1,314,050
	16,876,820 10	8,965,935 63	121,443,533

PROGRESS of Dredging Operations at Date of Writing the Close
of the Season 1923

THIRTY-FOOT PROJECT

Locality	Distance English miles	Total length requiring dredging	Length dredged in 1923	Total length of 30-foot channel dredged	Length yet to be dredged
	Miles	Miles	Miles	Miles	Miles
Division No. 1— Montreal to Sorel.....	45	22.90	.....	22.90	All com- plete.
Division No. 2— Sorel to Batiscan.....	36	12.45	.....	12.45	All com- plete.
Division No. 3— Lake St. Peter.....	20	18.00	.....	*0.50 †17.50	
Division No. 4— Batiscan to Quebec.....	59	10.00	0.06	8.67	1.38
Division No. 5— Quebec to the Traverse.....	60	4.65	4.65	
Totals.....	220	68.00	0.06	66.67	1.38

*Not widened. †Widened.

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PROGRESS of the Dredging Operations at the Date of Writing the
Close of the Season of 1923

THIRTY-FOOT PROJECT

Locality	Length of Dredging		Cubic yards yet require to be done
	Required	Done	
	Miles	Miles	
Division No. 1—			
Longueuil shoal.....		1.10	
Longue Pointe to Pointe aux Trembles (E.H.).....		5.05	
Ile Ste. Therese.....		0.40	
Varennas to Cap St. Michel.....		3.00	
Cap St. Michel to Varennes.....		4.50	
Vercheres Traverse.....		1.10	
Vercheres to Contrecoeur.....		1.70	
Contrecoeur channel.....		6.05	
Total.....		22.90	
Division No. 2—			
Sorel to Ile de Grace.....		4.40	
Stone Island.....		1.10	
Ile aux Raisin Traverse.....		0.25	
Lake St. Peter (<i>See</i> Div. 3).....			
Port St. Francis.....		0.50	
Three Rivers.....		0.50	
Cap Madeleine to Becancour.....		1.55	
Becancour to Champlain.....		2.25	
Champlain to Pointe Citrouille.....		1.30	
Batture Perron.....		0.60	
Total.....		12.45	
Division No. 3—			
Lake St. Peter.....		*0.30	200,000
		†17.50	
Total.....		18.00	200,000
Division No. 4—			
Batiscan to Cap Levrard.....		3.00	
Cap à la Roche channel.....	0.18	1.87	111,630
Pouillier Rayer.....		1.20	
Cap Charles.....		0.90	
Grondines.....		0.80	
Lotbiniere.....		0.40	
Cap Sante.....		0.20	
Ste. Croix.....	0.60	0.30	300,000
St. Augustin.....	0.60		500,000
Total.....	1.38	8.67	911,630
Division No. 5—			
Quebec to the Tranverse.....		4.65	550,000
Total.....		4.65	550,000
Totals.....	1.38	66.67	1,661,630

*Not widened. †Widened.

PROGRESS of Dredging Operations at Date of Writing the Close
of the Season 1923

THIRTY-FIVE FOOT PROJECT

Locality	Distance English miles	Total Length requiring dredging	Length dredged in 1923	Total Length of 35-foot Channel dredged	Length yet to be dredged
		Miles	Miles	Miles	Miles
Division No. 1— Montreal to Sorel.....	45	27.24	1.51	19.27	7.97
Division No. 2— Sorel to Batsican.....	36	19.75	0.27	6.61	13.14
Division No. 3— Lake St. Peter.....	20	18.32	.....	17.16	1.16
Division No. 4— Batsican to Quebec.....	59	15.54	.....	.....	15.54
Division No. 5— Quebec to Goose cape (north channel)...	66	8.14	0.75	7.39
Total.....	226	88.99	1.78	43.79	45.20

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PROGRESS of the Dredging Operations at the Date of Writing the
Close of the Season of 1923

THIRTY-FIVE FOOT PROJECT

Locality	Length of dredging in miles		Cubic yards yet to be dredged	Cubic yards dredged
	Yet to be done	Done		
Division No. 1—				
Longueuil shoal.....	1.88		517,959	203,495
Longue Pointe traverse.....	0.39	0.08	443,592	51,550
Longue Pointe curve.....	1.24	0.08	991,531	242,350
Pointe aux Trembles channel.....	0.05	3.02	53,625	1,223,475
Ile Ste. Therese channel.....	1.12		146,611	
Varennnes curve.....	0.45	1.69	593,546	2,297,060
Cap St. Michel curve.....	1.00		500,500	
Cap St. Michel to Vercheres.....	0.25	4.47	177,139	1,913,350
Vercheres traverse.....	0.06	0.66	70,513	215,875
Vercheres to Contrecoeur.....		1.91		1,157,700
Contrecoeur channel.....	0.92	7.36	988,382	4,624,493
Lanoraie to Sorel.....	0.61		159,215	
Totals, Division No. 1.....	7.97	19.27	4,642,613	11,929,348
Division No. 2—				
Sorel to Ile de Grace.....	0.71	4.27	738,256	2,971,804
Stone island.....	1.42	0.69	466,370	414,890
Ile aux Raisins.....	0.77	1.32	167,175	812,174
Port St. Francis.....	0.67	0.33	491,303	248,275
Three Rivers.....	0.72		533,192	
Cap Madeleine to Becancour.....	2.40		1,348,578	
Becancour to Champlain.....	1.16		932,750	
Champlain to Pointe Citrouille.....	4.06		2,632,356	
Batrure Perron.....	1.23		684,600	
Totals, Division No. 2.....	13.14	6.61	7,994,580	4,447,143
Division No. 3—				
Lake St. Peter.....	1.16	17.16	1,161,570	11,335,582
Totals, Division No. 3.....	1.16	17.16	1,161,570	11,335,582
Division No. 4—				
Batiscan to Cap Levrard.....	4.48		2,386,168	
Cap Levrard.....	1.27		781,666	
Cap a la Roche curve.....	2.06		1,836,859	
Cap Charles channel.....	2.04		1,077,416	
Grondines.....	0.83		513,332	
Lotbiniere.....	0.47		321,480	
Cap Santé.....	1.51		655,561	
St. Croix.....	1.47		798,518	
Ste. Augustine.....	1.41		826,207	
Totals, Division No. 4.....	15.54		9,197,207	
Division No. 5—				
Quebec to Goose cape (north channel).....	2.84		2,585,132	
Madame Reef shoal..... (West Sand and East Narrows shoal).....	4.55	0.75	194,513	13,373,528
Totals, Division No. 5.....	7.39	0.75	2,779,645	13,373,528
Totals.....	45.20	43.79	25,775,615	41,085,601

ABSTRACT of Work of Dredging Fleet during Fiscal Year ending March 31, 1924

Dredges	Locality of dredging	Time of Service, days	Working Hours 10 per day	Hours Actual dredging	No. of Scows filled	Cub. yds. dredged (Scow measure)	Depth of dredging at L.W.	Width in feet	Character of Soil	Remarks
Dredge No. 1.....	Vercheres traverse.....	22	220	157½	89	22,250	35	225	Clay.....	Captain Octave Matte. Channel and widening.
	Contrecoeur channel..	29	290	243½	149	37,250	35	350	Clay.....	
	Cap a la Roche.....	98	980	533	313½	53,375	30	150	Shale, rock and boulders.	
	Total.....	149	1,490	933½	551½	112,875				
Dredge No. 4.....	Contrecoeur channel..	116	1,160	934½	790	51,500	35	225	Clay	Captain Maxine Peloquin. Cleaning up.
	Champlain channel....	42	420	343	206	197,500	30	225	Sand	
	Total.....	158	1,580	1,277½	996	249,000				
Dredge No. 12.....	Contrecoeur channel...	153	1,530	1,065½	1,445	361,250	35	225	Clay	Capt. Jean Bilodeau
	Total.....	153	1,530	1,065½	1,445	361,250				
Dredge No. 13.....	Contrecoeur channel..	151	1,510	1,300½	1,612	375,900	35	225	Clay	Captain L. St. Germain.
	Sorel to Ile de Grace.	9	90	67	39	9,750	35	225-400	Clay	
	Total.....	160	1,600	1,367½	1,651	385,650				
Dredge No. 16.....	Ile au Raisin channel.	21	228	160½	63	34,950	35	225	Very soft blue clay	Captain A. Bourget.
	North channel, East narrows.....	83	906	643½	301½	170,325	35	1,000	Sand, gravel, clay, and stones.	
	Total.....	104	1,134	803¾	364½*	205,275				

Total cubic yards dredged..... 1,314,050

* Hopper barges.

CLASSIFICATION of Disbursements for Fiscal Year ended March 31, 1924

Vessels	Fuel	Wages	Board	Stores and materials	Repairs and labour	Expenditure, New plant	Proportion of general and office expenses, etc.	Expenditure for each vessel	Rock cutter and stone lifter services, elevator dredges	Tug service	Inspection and sweeping service	Total cost of operations of each dredge and plant during fiscal year	Total expenditure on different appropriations
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Dredge No. 1.	7,528 01	11,746 43	3,856 11	2,770 89	18,756 92	.....	9,504 30	51,162 66	7,862 02	22,799 18	8,460 88	93,254 74	.....
Tug <i>Varannes</i>	4,169 41	6,520 14	2,360 78	1,373 12	2,841 60	.....	5,534 13	22,799 18	.....	.....	.....	.....	.....
Dredge No. 4.	6,532 65	11,894 36	3,807 52	1,839 74	14,186 06	.....	8,579 93	46,860 26	7,862 01	24,867 89	8,460 89	88,051 05	.....
Tug <i>Laviolette</i>	4,216 35	7,569 12	2,597 84	1,604 68	3,083 90	.....	5,796 00	24,867 89	.....	.....	.....	.....	.....
Dredge No. 12.	10,135 36	12,019 99	4,140 43	2,594 43	20,443 69	.....	10,181 91	59,515 84	7,862 01	22,676 27	8,460 89	98,515 01	.....
Tug <i>James Howden</i>	3,879 71	6,697 91	2,221 05	1,409 92	2,949 10	.....	5,518 58	22,676 27	.....	.....	.....	.....	.....
Dredge No. 13.	12,058 23	12,114 01	4,193 43	2,544 78	27,283 16	.....	11,465 98	69,659 59	7,862 01	12,651 42	8,460 89	107,561 38	.....
Tug <i>Lac St. Pierre</i>	2,868 68	3,079 99	1,184 25	744 99	523 93	.....	4,249 58	12,651 42	.....	8,927 47	.....	.....	.....
Tug <i>Contrecoeur</i>	1,307 87	3,116 58	359 19	174 56	191 10	.....	3,778 17	8,927 47	.....	.....	.....	.....	.....
Dredge No. 16.	8,263 26	24,510 94	6,766 32	5,925 33	16,103 20	.....	11,189 97	72,759 02	.....	18,266 19	8,428 31	163,200 53	.....
Hopper Barge No. 1.	2,842 74	3,160 11	1,096 00	2,244 44	4,630 95	.....	4,291 95	18,266 19	.....	39,074 97	.....	.....	.....
Hopper Barge No. 2.	9,097 22	9,264 25	3,034 40	3,544 72	7,208 33	.....	6,926 05	39,074 97	.....	24,672 04	.....	.....	.....
Hopper Barge No. 3.	5,032 07	6,412 61	2,070 09	3,674 97	2,379 46	.....	5,102 84	24,672 04	.....	.....	.....	.....	.....
Str. <i>Detector</i> , divided equally between the dredges	5,511 31	13,278 05	5,325 90	4,695 97	5,347 68	.....	7,982 60	42,141 51	.....	.....	.....	.....	.....
Rock Breaker No. 1.	1,644 03	6,923 41	2,206 09	2,477 82	3,627 27	.....	5,478 14	22,356 76	.....	.....	.....	.....	.....
Stone Lifter No. 5.	410 51	2,913 22	934 40	460 04	544 21	.....	3,798 91	9,091 29	.....	.....	.....	.....	.....
Sounding Scow, divided equally between Dredges 1, 4, 12 and 13.	.....	.....	.....	.....	113 85	.....	16 50	130 85	.....	.....	.....	.....	.....
	85,517 41	141,251 12	46,153 80	38,080 40	130,214 41	.....	109,395 57	550,612 71	31,448 05	173,935 43	42,271 86	550,612 71	.....

DETAILS of Dredging, Locality and Cost per Cubic Yard

Dredge	Total cost of operations of each dredge and plant during fiscal year	Number of days in operation each dredge	Cost per day operating dredges and plant	Days working each locality	Cost of work each locality	Total cost of operations of each dredge	Number of cubic yards dredged in each locality	Total cubic yards for each dredge	Cost per cubic yard each locality	Average cost per cubic yard for each dredge	Kind of material dredged	Locality of dredging
	\$ cts.		\$ cts.		\$ cts.		\$ cts.		\$	\$		
Dredge No. 1	93,284 74	149	626 07	22	13,773 59	93,284 74	22,250	112,875	0.6190 100	0.824 100	Clay	Vercheres Traverse.
				29	18,156 09		37,250		0.4834 100		Clay	Contrecoeur Channel.
				98	61,355 06		53,375		1.149 100		Shale, rock and boulders	Cap a la Roche.
Dredge No. 4	88,051 05	158	557 28	116	64,645 07	88,051 05	197,500		0.3273 100		Clay	Contrecoeur Channel.
				42	23,405 98		51,500	249,000	0.4513 100	0.3596 100	Sand	Champlain Channel (cleaning up).
Dredge No. 12	98,515 01	153	643 89	153	98,515 01	98,515 01	361,250	361,250	0.2727 100	0.2727 100	Clay	Contrecoeur Channel.
Dredge No. 13	107,561 38	160	672 25	151	101,511 05	107,561 38	375,900		0.27		Clay	Contrecoeur Channel.
				9	6,050 33		9,750	385,650	0.6206 100	0.2789 100	Clay	Sorel to Ile de Grace.
Dredge No. 16	163,200 53	104	1,569 23	83	130,246 58	163,200 53	170,325		0.7616 100		Sand, gravel, clay and stones.	North Channel, East Narrows.
				21	32,953 95		34,950	205,275	0.9428 100	0.790 100	Very soft blue clay	Ile au Raisin.
	550,612 71	724		724	550,612 71	550,612 71	1,314,050	1,314,050		0.4190 100		

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SOREL SHIPYARD

REPORT OF LOUIS LACOUTURE, SUPERINTENDENT

New Construction.—No vessels were built at the shipyard during the fiscal year 1923-24.

Repairs to Dominion Steamers, Etc.—Repairs were made to the C. G. steamers *Contracour*, *Berthier*, *Argenteuil*, *Verchères*, *Shamrock*, *Bellechasse*, *Emilia*, *Lady Grey*, *Margaret*, steamer *Detector*, tugs *Deschaillons*, *Jas. Howden*, *Lac St. Pierre*, *Lavaltrie*, *Laviolette*, *Monitor*, and *Varennnes*; dredges Nos. 1, 3, 4, 7, 8, 10, 12, 13, 16, 121, 123; dump scows Nos. 10, 11, 30, 100; hopper barges Nos. 1, 2, 13; coal barge No. 6, rock breaker "L," and stone lifter No. 5.

Shipyard Buildings were kept in good repair and wharf No. 1 reconstructed.

Shear Legs.—One hundred and thirty tons lift, were kept in good condition, and rendered good service to Government vessels, and others.

Heating System.—Alterations were made to this system resulting in a coal consumption reduction of 400 tons.

Hauling Ways were reconstructed, wood structure being replaced by cement.

EXPENDITURE AND REVENUE

STATEMENT OF EXPENDITURE, MARINE DEPARTMENT, 1923-24

Service	Appropriation	Expenditure	Balance
	\$ cts.	\$ cts.	\$ cts.
<i>Ocean and River Service—</i>			
Dominion steamers and icebreakers.....	1,500,000 00	1,468,633 40	31,366 60
Examination of masters and mates.....	20,000 00	18,666 01	1,333 99
Rewards for saving life.....	140,000 00	84,524 56	55,475 44
Investigation into wrecks.....	12,300 00	4,790 73	7,509 27
Schools of navigation.....	8,000 00	6,509 30	1,490 70
Registration of shipping.....	5,000 00	2,085 35	2,914 65
Removal of obstructions.....	5,000 00	4,927 00	73 00
Distressed seamen.....	5,000 00	2,988 35	2,011 65
Cattle inspection.....	3,500 00	3,416 35	83 65
Wrecking plants.....	35,000 00	35,000 00	
Hydro surveys.....	364,080 00	351,479 23	12,600 77
Unforeseen expenses.....	5,000 00	4,949 39	50 61
Radio telegraph.....	432,490 00	417,770 54	14,719 46
Tidal survey.....	35,000 00	33,538 43	1,461 57
Total.....	2,570,370 00	2,439,278 64	131,091 36
<i>Public Works (Capital)—</i>			
Ship channel.....	629,540 00	626,372 22	3,167 78
Sorel Shipyard.....	125,000 00	124,359 53	640 47
Self propelling barge.....	54,800 00	54,800 00	
Total.....	809,340 00	805,531 75	3,808 25
<i>Lighthouse and Coast Service—</i>			
Agencies, rents and contingencies.....	212,000 00	203,542 58	8,457 42
Salaries and allowances to lightkeepers.....	650,000 00	627,164 07	22,835 93
Maintenance and repairs to lighthouses.....	850,000 00	749,426 24	100,573 76
Construction of lighthouses, etc., apparatus.....	500,000 00	450,782 38	49,217 62
Signal service.....	104,000 00	98,184 22	5,815 78
Administration of pilotage.....	250,000 00	84,986 09	165,013 91
Maintenance and repairs to wharves.....	10,000 00	9,191 36	808 64
Breaking ice in Lake Superior.....	40,000 00	34,167 44	5,832 56
Harbour master, Amherst.....	600 00	600 00	
Patrol of northern waters.....	15,000 00	7,978 94	7,021 06
Allowance J. Davidson.....	500 00	500 00	
Pension to retired pilots.....	27,189 69	26,535 43	654 26
Total.....	2,659,289 69	2,293,058 75	366,230 94

EXPENDITURE AND REVENUE—*Concluded*
STATEMENT OF EXPENDITURE, MARINE DEPARTMENT, 1923-24

Service	Appropriation	Expenditure	Balance
	\$ cts.	\$ cts.	\$ cts.
<i>Miscellaneous—</i>			
C. P. R. bridge.....	6,065 92	3,662 70	2,403 22
P. R. dry dock.....	68,000 00	62,621 75	5,378 25
Total.....	74,065 92	66,284 45	7,781 47
<i>Scientific Institutions—</i>			
Meteorological service.....	287,629 00	228,875 99	58,753 01
Total.....	287,629 00	228,875 99	58,753 01
<i>Civil Government—</i>			
Salaries.....	441,020 00	339,532 43	41,487 57
Contingencies.....	80,500 00	70,189 56	10,310 44
Minister.....	10,000 00	10,000 00	
Total.....	531,520 00	479,721 99	51,798 01
<i>Steamboat Inspection—</i>			
Steamboat inspection.....	119,210 00	111,499 61	7,710 39
Total.....	119,210 00	111,499 61	7,710 39
<i>Sundry—</i>			
Montreal Harbour Commission.....		3,285,000 00	
Quebec Harbour Commission.....		449,000 00	
Vancouver Harbour Commission.....		2,778,000 00	
Consolidated revenue.....		873 09	
Imperial Government.....		3,139 20	Credit
Premium.....		49 39	"
Workmen's compensation discount and exchange.....		5,972 30	
Victoria (B.C.) shipowners.....		26,951 70	"
Gratuities.....		2,734 67	
Bonus.....		177,509 14	
Retirement Act, 1920.....		7,199 56	

RECAPITULATION OF SERVICES

Ocean and River Service.....	\$2,570,370 00	\$2,439,278 64	\$ 131,091 36
Public Works (Capital).....	809,340 00	805,531 75	3,808 25
Lighthouse and Coast.....	2,659,289 69	2,293,058 75	366,230 94
Scientific Institutions.....	287,629 00	228,875 99	58,753 01
Steamboat Inspection.....	119,210 00	111,499 61	7,710 39
Civil Government.....	531,520 00	479,721 99	51,798 01
Miscellaneous.....	74,065 92	66,284 45	7,781 47
	\$7,051,424 61	\$6,424,251 18	\$ 627,173 43

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STATEMENT OF REVENUE FOR FISCAL YEAR 1923-24

	Gross	Refunds	Net
	\$ cts.	\$ cts.	\$ cts.
Harbour dues.....	1,756 00	8 50	1,747 50
Piers and wharves.....	111,143 78	2,339 42	108,804 36
Dominion steamers—			
<i>Stanley</i>	\$ 1,537 24		
<i>Montcalm</i>	248 08		
<i>Aranmore</i>	1,307 40		
<i>Druid</i>	500 00		
<i>Mikula</i>	1,248 13	4,840 85	4,840 85
Masters and mates.....	4,246 00		4,246 00
Steamboat inspection—			
Engineers fees.....	\$ 1,918 50		
Incidental.....	14,048 70		
Annual fees.....	112,450 09	128,417 29	520 34
Decayed Pilots Fund.....	9,836 42		127,896 95
Halifax Pilots Superannuation Fund.....	3,636 75		9,836 42
St. John Pilots Superannuation Fund.....	6,009 45		3,636 75
St. John Pilots revenue.....	47,999 50		6,009 45
Halifax Pilotage revenue.....	72,734 20		47,999 50
Casual revenue.....	58,279 82	2,208 34	72,734 20
Fines and forfeitures.....	1,184 75		56,071 48
Marine register.....	64 38		1,184 75
Signal Station dues.....	838 00		64 38
Sydney Pilots Superannuation Fund.....	6,723 10		838 00
Sydney Pilotage revenue.....	41,909 25	3 00	6,723 10
Pilots license fees.....	110 00		41,906 25
Premium, discount and exchange.....	84 83		110 00
Retirement Fund.....	1,923 24		84 83
Capital account—			1,923 24
Shipbuilding.....	\$ 994 52		
Ship channel.....	7,600 00	8,594 52	8,594 52
Radio Revenue—			
West Coast.....	\$48,334 62		
East Coast.....	1,128 21		
Central Canada.....	2,764 05	52,226 88	52,226 88
W/A License fees.....	37,661 35	1,702 70	35,958 65
W/O Examination fees.....	284 00		284 00
Total.....	600,504 36	6,782 30	593,722 06

METEOROLOGICAL SERVICE

REPORT OF SIR FREDERICK STUPART, DIRECTOR

During the past year, reports from 774 Observing Stations have been received at the Central Office, Toronto, being an increase of 88 over the previous year.

At 357 of these stations, the Observer is paid a small salary, ranging from \$12 per annum to as much as \$2,400 at a Chief Station.

Also, there are 100 storm signal display stations, at which the Agent is paid either \$75 or \$100 per annum according to the length of the season of navigation.

At 417 of the observing stations, the work is performed gratuitously, and, it is worthy of note that from the inception of this service, the major portion of climatic data obtained and utilized for the benefit of the country has been furnished by voluntary observers.

THE CENTRAL OFFICE

At the close of November, Mr. B. C. Webber Assistant Director of the service, was retired owing to ill health after a service of fifty years. The loss of Mr. Webber is greatly felt, he having always been closely identified with the forecasting work, and time alone will supply experience in such very special work as forecasting the weather.

No successor to Mr. Webber has yet been appointed, nor has the position of astronomer, rendered vacant by the retirement of Mr. Blake last year, yet been filled.

The staff of the Central Office now comprises thirty-five individuals, including two telephone boys, and the work performed there may be classified as follows: Weather forecasting. Atmospheric physics. Climatology and agricultural meteorology. Terrestrial magnetism. Astronomy.

Weather Forecasting.—The forecast branch has been decidedly handicapped by the retirement of Messrs. Webber and Sharp both of whom took tri-monthly turns at issuing forecasts. There are no trained persons such as there are in the professions and business, from among whom vacancies can be filled. It is a long and difficult task to acquire a knowledge which must be based largely on experience. At present there is but one experienced forecaster, exclusive of the Director, whereas, there should be three. However good progress is being made in training others.

The Central Office continues to issue storm warnings and daily forecasts to Newfoundland and each month sees an expansion in the dissemination of the Canadian forecasts. Of the daily forecasts issued 87 per cent were verified, and of storm warnings, 88 per cent.

Climatology.—A large majority of the reports received from the 774 observing stations, reach the Central Office as forms, on which the observation figures have been entered, but no means have been struck, and these necessary values have to be computed by members of the staff and tables are then prepared for publication in the "Monthly Record."

The records obtained from the automatic recording instruments arrive at the Central Office without any readings having been made and the reading and transcription of these data is work for several assistants.

The Monthly Weather Map which gives a tabular and graphical summary of the main features of each month about a week after its close, has been enlarged and improved in form. More space for special reports on the condition of crops and agriculture has been provided. Abstracts and reports were made during the year for those making special inquiries; in most cases a small charge for time expended having been made. A special report on the Climate of Ontario during the last thirty years, with maps and tables showing the normal temperature, precipitation and frost dates, was prepared for publication, but on account of lack of funds we have been unable to have printing begun. Work on a similar report for Quebec and the Maritime Provinces is continuing to complete a series for the different provinces of the Dominion.

Phenological notes from provincial organizations throughout Canada are being gathered on a larger scale than formerly, with the intention of determining the normal routes and dates of entry of migrating birds entering Canada in the spring and of departure in the fall and of correlating deviations from the normal with the weather and with other phenological phenomena. We wish to find out whether such deviations of migrations are connected with surface or upper air currents and whether the data, if so, can be used as any assistance in seasonal forecasting. This is very unlikely, but since there is a

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popular belief to the contrary which has never been proved or disproved we are arranging a system of gathering data which may at some future time provide sufficient material for an answer to the question, and may prove valuable in other ways besides.

AGRICULTURAL METEOROLOGY

The general conditions of weather-sequence necessary for good yields of spring wheat in the Canadian West having been determined, some time has been devoted towards establishing the possibility of forecasting the weather of summer in the Northwest some months in advance. Knowledge of the likely outcome of the following season's crop, whether good or poor, is generally believed to be an aim of agricultural meteorology which, if realized, would be of great value to industry. New methods of analyzing the weather data of the North American continent during the last thirty years have been used, with the result that such forecasts seem feasible. A detailed report on the whole question is being made ready for publication.

ATMOSPHERIC PHYSICS

Pilot balloon observations were carried on throughout the year at Toronto, Ont., and Victoria, B.C., on all days the weather permitted, and at the Canadian Air Force Stations at High River, Alberta, Dartmouth, N.S., and Camp Borden, Ont. The flights at Toronto and Victoria averaged about 25 minutes, and the longest flight was on October 26th, 1923, at Victoria, when the balloon reached a height of 46,000 feet.

Balloons carrying instruments to register the pressure and temperature of the upper air were sent up on the International days from Woodstock, Ont., and Calgary, Alberta. Out of twenty-nine instruments sent up thirteen have been found to date. The greatest height reached was 13 miles at Woodstock on February 12, 1923. The lowest temperature recorded was 95 below zero at a height of $7\frac{1}{2}$ miles on February 21, 1923, at Calgary.

Considerable difficulty has been experienced in getting satisfactory balloons for this work, owing to the lack of a suitable form on which to make the balloons. Through the kindness of the Principal of the Central Technical School, Toronto, Mr. Howell of the Art Department tried to make a form out of glazed pottery. Owing to the very special shape of the form, it proved to be a very difficult problem, but, after many trials one has been obtained which has a very good prospect of success. It is hoped that with this form, it will be possible to obtain balloons, made in Canada which will be superior to any obtained elsewhere in the world.

The apparatus for calibrating the instruments before sending them up on balloons has been remodelled and an automatic device substituted, so that greater accuracy can be obtained and the operation carried through more quickly.

Sea Water Temperatures.—A mercurial thermometer of the Negretti and Zambra type was installed on one of the C.P.O.S. boats between Vancouver and Hong Kong and is proving very satisfactory. The experiments so far have shown that the mercurial thermograph is superior to the resistance thermometers for this work; the latter are more accurate, but get out of order much more easily, and on that account are not so well adapted for use in the engine room. The temperatures of the sea water in the North Pacific as recorded by the ships during the past seven years, are being collected and tabulated in 5 degree squares and are now being worked up to see if any connection can be traced between them and the character of the seasons in Canada.

Earth temperatures.—Resistance thermometers at the following depths: Surface 4 inches, 10 inches, 20 inches, 40 inches, 66 inches, 9 feet and 15 feet were read daily throughout the year. At the depth of 15 feet the maximum temperature was $49^{\circ}.3$ and occurred in the third of November, while the minimum of $43^{\circ}.7$ occurred in the last week in May. Last winter the ground was not frozen when the first heavy fall of snow occurred so that the frost did not penetrate the ground to a depth of 4 inches throughout the winter at Toronto.

Evaporation.—Evaporation observations were made during the year at Toronto, Ont., Winnipeg, Man., and Olds, Alberta.

In order to more fully meet the needs of shipping at Vancouver in regard to supplying them with correct time, a wireless receiving set and a seconds clock were installed in the Vancouver office.

A new combined anemometer and wind vane has been designed and the first seven are now being completed in the workshop. The new anemometer has three cups 5 inches in diameter on arms 6.3 inches long, making 640 revolutions per mile of wind. This anemometer is the result of extensive tests made in the wind tunnel of the University of Toronto.

The cable from Sulphur Mountain Observatory to the Museum at Banff was repaired during the year and the wind instruments and thermometers were constructed in the workshop, but the recording mechanism was not received in time to install before winter set in.

Observations on the amount of dust in the atmosphere were made on International Days, and the heat from the sun was measured on all days that were sufficiently clear for the purpose.

TERRESTRIAL MAGNETISM

Continuous photographic records of the magnetic elements were obtained at the Agincourt Observatory without material loss. At the Meanook Observatory, continuous photographic records of the declination were obtained, but during the winter months, considerable loss was again experienced due to the clock driving mechanism stopping in excessive cold spells.

Magnetic disturbances were of infrequent occurrence during the year, as was to be expected during a minimum sun-spot period.

The larger disturbances were recorded on June 13, 30, September 27, October 15 to 18 of 1923, and January 29, 1924.

At Agincourt the regular programme of absolute Observations has been carried on without interruption. The declination and horizontal force values were obtained once each week, and the inclination, twice a week, and from the results of these Observations, control of the base values of the photographic records was obtained.

At Meanook, Observations of declination and inclination were made once a week, and of horizontal force, twice a month.

Tables showing the Magnetic character of each day of the year in Greenwich civil time were prepared and forwarded to the International Commission on Terrestrial Magnetism. The "selected" days of the commission, are used in the analysis of magnetic data for our annual Magnetic report in conformity with those of other magnetic observatories throughout the world.

At the request of the Surveyor General, index corrections for compasses attached to seventy-one (71) surveyor's theodolites were determined and the results forwarded to him. Assistance was also given to members of his staff in determining constants for their total force field instruments both before and after their summer work.

Assistance was also given to Messrs. French and Madill, of the Dominion Observatory staff in standardizing their magnetometers both before and after their summer field work.

The accompanying tables give a summary of the results obtained at Agincourt and Meanook during the fiscal year 1923-24. All results are reduced to International Magnetic Standard.

Month	Mean Monthly Values			
	D. West	H	Z	I
1923	° ' "	γ	γ	° ' "
April.....	7 00.3	15790	57870	74 44.3
May.....	00.4	91	851	44.0
June.....	00.2	90	858	44.1
July.....	00.0	88	849	44.1
August.....	01.9	82	827	44.0
September.....	01.7	77	817	44.2
October.....	02.2	67	818	44.8
November.....	02.7	68	812	44.6
December.....	03.4	68	798	44.4
1924				
January.....	03.8	60	788	44.7
February.....	04.1	61	789	44.7
March.....	04.4	61	769	44.4

Month	Mean Monthly Values					
	D. East		H	Z	I	
1923	°	'	γ	γ	°	'
April.....	27	21·9	12881	60042	77	53·5
May.....		20·6	88	60083		53·6
June.....		22·4	91	59986		52·3
July.....		23·3				52·6
August.....		23·5	71	59902		52·4
September.....		21·1	66	59980		53·6
October.....		23·1	69	60020		53·9
November.....		23·2	91	60123		53·9
December.....		21·9	73	59971		53·2
1924						
January.....		21·8	73	59979		53·2
February.....		22·0	67	59960		53·3
March.....		20·5				53·4

MEANOOK Daily and Monthly Ranges of "D"

Month	Diurnal Range		Absolute Monthly Range	
	From Hour Readings	From Max. and Min.		
1923	/	/	°	'
April.....	10.8	20.7	1	06.4
May.....	11.8	19.5	1	03.4
June.....	13.2	25.8	1	50.2
July.....	12.2	19.6	1	01.7
August.....	12.8	19.2	1	01.9
September.....	9.7	23.8	2	00.7
October.....	5.9	28.1	2	35.4
November.....	6.0	15.8	1	10.8
December.....	5.1	16.1	0	56.4
1924				
January.....	5.2	22.6	2	12.7
February.....	4.9	18.0	0	51.9
March.....	7.6	22.7	1	18.2

AGINCOURT Daily and Monthly Ranges

Month	D			H			Z		
	Mean Daily Range		Absolute Monthly Range	Mean Daily Range		Absolute Monthly Range	Mean Daily Range		Absolute Monthly Range
	From Hour Readings	From Max. and Min.		From Hour Readings	From Max. and Min.		From Hour Readings	From Max. and Min.	
1923	/	/	' °	γ	γ	γ	γ	γ	γ
April.....	11.7	15.8	0 39.2	38	57	101	6	15	86
May.....	10.7	14.8	0 41.5	31	52	134	8	19	105
June.....	11.9	18.6	1 15.1	38	64	188	13	35	201
July.....	9.8	13.9	0 34.0	32	55	133	6	18	81
August.....	10.6	13.0	0 26.0	36	53	125	8	18	71
September.....	10.3	18.6	2 18.5	31	65	285	13	40	390
October.....	6.2	17.0	1 41.4	22	42	199	14	32	207
November.....	6.8	10.8	0 32.9	17	24	54	5	11	80
December.....	4.4	9.1	0 25.9	10	18	50	3	6	32
1924									
January.....	7.6	16.2	2 13.4	10	27	182	4	10	115
February.....	5.4	11.0	0 25.0	11	20	43	3	7	45
March.....	8.6	14.4	0 30.7	15	28	42	6	14	48

ASTRONOMY

On the retirement of F. L. Blake, D.L.S., the astronomical work was placed in charge of the Department of Magnetism under Mr. Jackson.

During the year ending March 31, 1924, one hundred and seventeen (117) observations, for the determination of correct time were made by meridian transits of stars with the 3 inch Troughton & Simms Transit instrument.

The positions of stars used were generally from the American Ephemeris or British Nautical Almanac. Instrumental constants were controlled by observations of suitable stars sets about once a month.

Time has been given over telegraph and telephone lines to all inquirers, and the demand for this service is continually increasing. The usual 11.55 a.m.

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signal on the fire alarm system has been continued throughout the year. Once a week, time has been sent to Agincourt Magnetic Observatory to control the error and rate the Master Clock there.

Time exchanges were made with Quebec, Montreal, and St. John, N.B., on ten occasions with the results shown in the following table:—

The sign + indicates slow of Toronto.

1923	Toronto —Montreal	Toronto —Quebec	Toronto —St. John N.B.
	seconds	seconds	seconds
April 13.....	−0.44	+1.17	−1.04
May 4.....	−0.80	−0.77	−0.91
June 1.....	+0.68	−0.90	+0.23
June 29.....	0.00	−0.45	−0.65
September 28.....	+0.01	−0.39	−0.26
November 2.....	−0.51	+0.54	−0.42
December 28.....	0.00	−0.14	0.00
1924			
February 8.....	−0.07	−0.37	−1.28
March 7.....	+0.73	−0.04	−0.29
March 28.....	+0.05	+0.26	+0.11
Average difference.....	0.33	0.50	0.52

During the year ending December 31, 1923, the sun was observed on 139 days and on 69 of these it was free of spots. Maps were made using the 6-inch equatorial telescope with a power of 50 and projecting the image on to a plane surface where its diameter was about 5 inches. The positions of the N., S., E. and W. points together with the sun's axis and equator are marked on the image as well as the spots and faculæ.

The mean sunspot relative numbers for the months of the civil year were as follows: January, 0.0; May, 5.6; June, 15.0; July, 2.4; August, 0.7; September, 16.3; October, 14.9; November, 17.1; December, 6.2. Yearly mean, 8.7.

These relative numbers are computed from Wolf's formula $R = 10g + f$ where g is the number of groups visible and f the total number of spots.

SEISMOLOGY

The Milne Seismograph which had been in operation since September, 1897, and performed some good service, was superseded in May, 1923, by two Milne-Shaw Seismographs for recording both horizontal components. This model of instrument is the one adopted by the Seismological Section of the British Association for all their stations, as being the most reliable for recording the preliminary waves of distant earthquakes.

The instrument has a high magnification and is equipped with electro magnetic damping. The magnification is approximately forty times greater than the standard Milne whilst the sensitivity to tilt is from ten to twenty times greater according to pendulum period. These instruments were started officially on May 1, 1923, and the constants were adjusted as called for. We found some difficulty at first with the cut-off apparatus. We coupled it up to the Observatory magneto clock, and the adjustment by the aid of an auxiliary clock is such that a break of 2½ seconds is made every two minutes on the record by the magneto clock.

Some excellent records of world-shaking earthquakes have been secured from these instruments and it is now possible to measure very closely, the times of the various earthquake phases, and record many more than would be possible with the Milne instrument.

Two hundred and seventy-three (273) earthquakes have been recorded during the past year. The month of March contributed 44. The disastrous Tokyo quake of September 1 and also the Costa Rican quake of March 4 were well recorded. The most important occurred on August 28, September 1, 2 and 30. G.M.T., November 4 and March 4. The first waves of the Japanese quake came in at 3h. 56m. 48s. G.M.T., followed by some very large and rapid vibrations. The time the earthquake began as deduced from the Toronto seismogram was 2h. 58m. 58s. G.M.T. and the epicentre was in the bed of the Pacific. The maximum movement was recorded at 3h. 56m. 18s. G.M.T. and showed a displacement of earth particles of 0.8 mn. with a period from 17 to 20 seconds. Earth tremors from this earthquake were recorded up to 10h. 10m. G.M.T.

Information is frequently given on the phone to the Canadian Press regarding times and distances of strong earthquakes. Abstracts of our observations are forwarded to many seismological stations throughout the world and we receive bulletins in return from these stations. Our original seismograms are often borrowed to aid in seismological investigations.

APPENDIX "A"

The Director of the Quebec Observatory reports as follows:—

During the year under review the meteorological observations were taken daily as usual without interruption and the instruments were kept in good order.

Several barometers and thermometers were compared with the standards at the observatory, and I have also rated chronometers and sidereal watches for land surveyors and civil engineers.

Inquiries respecting the weather conditions were very numerous, and statistics were prepared and furnished to the public and also given in many important cases before our local courts, and for cases before the courts in the city of Montreal where I was called to give evidence.

Special reports were also supplied to engineers in connection with water-powers, etc.

The public is very much interested in the forecasts issued by your office, and I am pleased to report that this service is giving great satisfaction.

The correct time was given as usual by means of the noon gun, by the time-ball and the telephone, the daily rate of the clocks being obtained by observations of stars and of the sun.

The time-ball was operated from April 23 to December 14, in a satisfactory manner, the last seagoing vessel having left the port on the 8th. The time-ball apparatus has been overhauled and is ready for the opening of next season.

The daylight saving system was again adopted last year by the civic authorities and the shipping during the summer months. A referendum will be held shortly as to the advisability of putting this system in force for the coming season.

The observatory was visited on several occasions by students of our local educational institutions, preparatory to their matriculation in Sciences.

The usual exchanges of time were made between your office and this observatory at regular intervals.

This station was inspected during the year by one of the official inspectors of your department.

APPENDIX " B "

The Director of the St. John, N.B., Observatory, reports as follows:—

The tri-daily meteorological observations have been made daily including Sundays and holidays without interruption at 9 a.m., 3 p.m. and 9 p.m. Atlantic Standard time. The results of the morning and night observations have as in the past been promptly telegraphed to Toronto for use of the forecast branch; Eye readings of the standard instruments at the above named hours serve as a check upon the recording instruments from which hourly values of temperature, pressure, humidity, bright sunshine, precipitation and wind direction and velocity are abstracted. From these tabulated records data for any hour of the day or night may be accurately obtained.

The only change in the meteorological equipment was the addition of a new recording thermograph to replace the instrument which was becoming worn by many years of service. The anemograph diagrams from the wind station at Point Lepreaux are sent here weekly and these as well as the St. John diagrams are tabulated for every hour and a monthly analysis made.

The duties of provincial agent for the Maritime Provinces has as for several years past been carried on in addition to the prescribed work of the observatory. Monthly returns from all stations in New Brunswick, Nova Scotia and Prince Edward Island have been checked, tabulated and in most instances summed, meaned, prepared for publication and copies of the climatic and statistical records kept in our abstract book for future immediate reference. Annual supplies are put up and forwarded to the individual observers. On occasions instruments are issued to replace those accidentally damaged or out of order. Minor repairs have been made to station instruments and apparatus. Some stations have been inspected and where changes of observers have been made, instruments were installed and the new observers instructed.

Telephone calls for the time, weather forecasts and other information require considerable time and attention. Clerical work in answering correspondence for information on specified dates for use of transportation companies, engineers, commercial houses and other interests including tabulated records for field workers in scientific investigation is continually increasing. Settlement of claims for damage to perishable goods in transit are frequently facilitated by information from our records particularly during the months of winter navigation when shipments through this port are extensive.

The morning weather bulletin received each week day morning by telegraph from Toronto has been decoded and printed in the observatory, it is posted, displayed in public places and published in the evening papers supplemented by a daily report on local conditions.

MARITIME PROVINCE TIME SERVICE

Sidereal observations for time have been made on available clear nights with the Troughton and Simms Astronomic Transit Telescope, all observations continue to be made by the impersonal micrometer method, reversing the telescope on each star to eliminate collimation and pivot errors, nine contacts are made in each position of the axis and the records registered on the chronograph along with the seconds from the observing clock.

The two sidereal time clocks of precision continue to give most satisfactory results and maintain steady rates. The Riefler clock in the basement clock room is run under constant temperature and pressure, no changes of pressure have been made by the air pump throughout the year the sealing of the clock case remaining absolutely perfect.

The transmitting clock is run on Atlantic Standard time and has a very small daily rate. After comparison with the Sidereal clocks any outstanding error is adjusted by a switch outside of the protecting case that electrically controls two small weights which by this means may be placed on or off a small shelf attached to the pendulum, it may be accelerated or retarded and usually in a few minutes exactly corrected. The well known code of signals from this clock are entirely automatic.

Three loop lines connect the observatory with the outside time signal service, two of these loops run to the Telegraph Office and one to the Telephone Office.

One loop line from the observatory to the Western Union Office is also extended to the time ball tower on the Customs Building here and is used at 1 p.m. for automatically releasing the time ball at that hour. The clock signals are widely disseminated throughout the Maritime Provinces and are also received at all telegraph offices on the Intercolonial division of the Canadian National Railways and their branch lines, as well as to the Dominion Atlantic Railway in Nova Scotia.

At many points such as Halifax, Truro, the Sydneys, Moncton, Charlottetown, etc., the Telegraph Company have installed clocks which are electrically wound and daily corrected by the 10 a.m. signal, this is done by one of their operators throwing a switch during the ten seconds pause before the dot made at the hour exactly and throwing it open again during the ten seconds pause of safety after the hour. These clocks have second hands and are set to the second. As our time is available to the Telegraph Company every hour they may correct any of these clocks at hours other than 10 a.m. These corrected clocks being installed in the Telegraph Company's public offices, the public are afforded the opportunity of obtaining the correct time.

Another contact maker on the transmitting clock which closes the circuit on the 59th second and opens it at the hour exactly is purely for local purposes and is used for the correction of tower, hotel, street, bank, factory and watch and chronometer rater clocks. In these cases the clocks are purchased outright and the signal of correction automatically is sent from our transmitting clock every hour day and night on a loop line connecting the observatory clock relay with a special switch board in the operating room of the Telephone Company, who charge an annual rental for the wire service to the owners of the clocks, within a prescribed radius the fee paid to the Telephone Company by the users is ten dollars yearly. Some watchmakers have bells or sounders which give them a signal stroke every hour. Another loop in the Telegraph Office is used for synchronizing clocks in their St. John Offices and operating room.

The master clock in Halifax, which is superior to the usual commercial type is firmly mounted on a solid masonry pier, it is synchronized at 10 a.m. daily by the signal from St. John or at a following hour should wire trouble occur. This clock is fitted with hourly contacts and is primarily used for automatically dropping the time ball on the Citadel, as well as correcting a subsidiary clock in the signal station there which is used to give the time for the hoisting of the time ball. The same hourly contact on the master clock is used for firing the noon gun through a loop line connecting the master clock with the Citadel and for correcting electric clocks in Halifax.

Watch and chronometer repairers in Halifax have by arrangement with their Telephone Company a wire circuit connected with our switch board and relays in the Western Union Office there and receive the regular time sent daily at 10 a.m. from the St. John Observatory. This line also extends to the dockyard and other points.

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The Western Union Telegraph Company and the New Brunswick Telephone Company most heartily co-operate with us for the satisfactory and successful dissemination of time signals.

Daylight saving time was again in operation at St. John but elsewhere in the province standard time was generally used resulting in confusion and annoyance to the travelling public.

The entire work of the observatory is done with one young lady assistant with the rating of junior clerk stenographer but owing to the large amount of clerical work done should have higher classification.

The spacious lawns upon which the outside instruments are located are maintained in good condition by the caretaker.

APPENDIX "C"

The Director of the Gonzales Heights Observatory, Victoria, B.C., reports as follows:—

During the past year the regular meteorological observations have been taken, and daily weather forecasts issued for the following districts: Victoria, Nanaimo, Lower Mainland, Okanagan, Kamloops and Kootenay. From the 1st of July, 1923, a special weather summary and general forecasts of the winds is sent out through this office by the Dom Radio stations at Gonzales to Estevan, where at 10 p.m. daily it is broadcasted to the ships within a radius of 3,000 miles, and in some cases ships have reported receiving these messages at much greater distances, and appreciate this knowledge of weather conditions both on the coast from Alaska to California, and also the positions and movements of some of the great Pacific storms are given westward to the 150th Meridian.

During the summer months the Provincial Forestry Department is kept informed of approaching hot dry spells and also when these are likely to cease. This information has proved of value in connection with the fighting of forest fires.

TIME SERVICE

The Time Ball in the city has been dropped daily from this Observatory at 1 p.m. Time guns at the Work Point Barracks have been fired from here by signal daily at noon and at 9 p.m.

Time is also sent out from here for two minutes and through the Gonzales Radio station is broadcasted at 10 a.m., and at 10 p.m. daily it is sent through the powerful Estevan station to shipping within a 3,000 mile radius.

During the past year the Milne-Shaw seismographs have been in continuous operation and have given very satisfactory results. The total number of earthquakes recorded was 226. July and September were the most disturbed months with records of 28 quakes during each month, while in December only 11 quakes were registered.

Balloon ascents have been made throughout the year and on January 18, 1924, at an elevation of 20,000 feet a balloon was observed to be travelling at the extremely high velocity of 137 miles per hour from the northwest. On this date there was centred over the Pacific ocean and far off this coast one of the most severe storms ever recorded.

On October 1, the provincial weather observing stations (64) were transferred to our service, and these monthly returns are now received here, where they are checked and copied into registers. This arrangement is proving very satisfactory in every respect as all observing stations now numbering over 200

in British Columbia come under one department for supervision including inspection. Over 2,000 visitors were shown over this institution during the past year, and lectures have been given on meteorology and seismology both in Victoria and at the University of British Columbia at Vancouver.

APPENDIX " D "

The Director of the McGill University Observatory reports as follows:—

ASTRONOMICAL WORK

Time Service.—Sidereal observations for the determination of clock errors, were made on sixty seven nights throughout the past year.

Our Standard time has also been compared on frequent occasions, with the noon and 10 p.m. signals broadcasted from Arlington Observatory. For this service, we are again indebted to Mr. F. R. Redpath and Mr. A. Stirling.

The noon time ball has been dropped daily for the benefit of shipping, and other time signals have been distributed throughout the city and district as in former years.

The interchange of clock signals with Toronto Observatory have been continued, comparisons having been made on ten occasions.

METEOROLOGICAL SERVICE

The usual meteorological observations have continued throughout the year, without interruption. These have been reduced, and results for each day been published in the *Montreal Gazette*. We have, unfortunately, been compelled to discontinue publication and distribution of our monthly and annual summaries, as no further requisition from the Department of Public Printing and Stationery, Ottawa, is forthcoming.

The number of persons, requesting special information continues to increase. These inquiries are received for the greater part from the legal profession, from the engineering profession, from corporations, manufacturers, and from the English and French press.

In addition to the inquiries mentioned above, we are continually being referred to by telephone calls, for the correct time. This latter state of affairs has been brought about by the Bell Telephone Company of Canada, refusing their operators permission to answer inquiries as to the time.

RESULT of Time Exchanges, Toronto vs. Montreal, for year ending March 31, 1924.

Date	Montreal	Toronto
April 13, 1923.....	3 42 00.95 fast 0.10	3 42 00.00 slow 0.60
Montreal fast on Toronto.	3 42 00.85 Difference 0.25 s.	3 42 00.60
May 4, 1923.....	3 47 01.69 fast .55	3 47 00.00 slow 0.30
	3 47 01.14 Difference 0.84 s.	3 47 00.30

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RESULT of Time Exchanges, Toronto vs. Montreal, for year ending March 31, 1924.—*Concluded.*

Date	Montreal	Toronto
Montreal fast on Toronto.		
June 1, 1923.....	2 36 00.0 slow 0.5	2 36 01.6 fast 0.5
	2 36 00.5 Difference 0.6 s.	2 36 01.1
Toronto fast on Montreal.		
June 29, 1923.....	2 48 00.3 fast .7	2 48 00.0 fast .5
	2 47 59.6 Difference 0.1 s.	2 47 59.5
Montreal fast on Toronto.		
Sept. 28, 1923.....	3 47 00.0 00.0	3 47 00.0 fast 0.2
	3 47 00.0 Difference 0.2 s.	3 46 59.8
Montreal fast on Toronto.		
Nov. 2, 1923.....	3 40 00.0 fast .5	3 39 58.1 slow 1.0
	3 39 59.5 Difference 0.4 s.	3 39 59.1
Montreal fast on Toronto		
Dec. 28, 1923.....	3 44 00.0 slow .3	3 44 00.2 slow 0.0
	3 44 00.3 Difference 0.1 s.	3 44 00.2
Montreal fast on Toronto.		
Feb. 8, 1924.....	3 47 00.0 slow 0.5	3 47 01.4 Error not given
	3 47 00.5	
March 7, 1924.....	3 44 00.0 slow 0.5	3 44 01.3 fast 0.2
	3 44 00.5 Difference 0.6 s.	3 44 01.1
Toronto fast on Montreal.		
March 28, 1924.....	3 35 00.00 slow 0.1	3 35 00.5 fast 0.4
	3 35 00.1 Difference Nil.	3 35 00.1

REPORT OF L. A. DEMERS, DOMINION WRECK COMMISSIONER

Formal Investigations during the year.. . . .	29
Preliminary Inquiries during the year.. . . .	2

During the calendar year 1923 there were 376 casualties reported to the department, the net tonnage of same being 480,713, and the stated damage \$3,184,749, made up as follows. Ship, \$3,087,119; cargo, \$97,630; while 50 lives were lost.

Of the total number of casualties 309 were to coasting and sea-going vessels, the net tonnage of same being 396,289, and the stated damage \$2,796,074, made up as follows: Ship, \$2,698,444; cargo, \$97,630; while forty-six lives were lost.

The remaining sixty-seven casualties were to inland vessels, the net tonnage of same being 84,424, and the stated damage \$388,675; while four lives were lost.

In ninety-one casualties to coasting and sea-going vessels, and in twenty-three casualties to inland vessels, the amount of damage is not stated.

Sixty-seven of the casualties to coasting and sea-going vessels, made up of thirty-six steam and thirty-one sailing vessels, resulted in total loss, the net tonnage of same being 24,179. Of this number fifty-five were Canadian, two British and ten Foreign vessels.

Five of the casualties to inland vessels, all Canadian, resulted in total loss, the net tonnage of same being 2,965. Of this number four were steam vessels and one sailing.

The casualties are given under the following headings:—

COASTING AND SEA-GOING VESSELS

Collisions.....	72
Foundering.....	20
Strandings.....	149
Miscellaneous accidents.....	67
Missing vessels.....	1

INLAND VESSELS

Collisions.....	31
Foundering.....	3
Strandings.....	27
Miscellaneous accidents.....	6

MASTERS AND SEAMEN BRANCH

REPORT OF B. F. BURNETT, SUPERINTENDENT

Navigation schools were in operation at St. John, N.B., at Halifax, North Sydney and Yarmouth, N.S., at Quebec, P.Q., and at Kingston, Ont., and marine lectures were delivered at Collingwood, Ont., and at Vancouver, B.C.

Examinations for masters' and mates' certificates were held at Halifax, Yarmouth and North Sydney, N.S., at Charlottetown, P.E.I., at St. John, N.B., at Quebec and Montreal, P.Q., at Ottawa, Kingston, Toronto, Collingwood and Port Arthur, Ont., at Edmonton, Alta., and at Nelson, Prince Rupert, Vancouver and Victoria, B.C.

Issued during the year 20 masters', 41 mates' and 28 second mates' sea-going certificates of competency; 67 masters' and 94 mates' coasting certificates of competency; 61 masters' and 60 mates' inland water certificates of competency; 26 masters' and 14 mates' minor inland waters certificates of competency and 5 masters' service coasting certificates and 38 masters' temporary certificates.

Thirty-one thousand four hundred and seven seamen were shipped and thirty thousand one hundred and ninety-five seamen were discharged at sea-ports.

PILOTAGE REPORT

CAPT. G. E. L. ROBERTSON, DIRECTOR PILOTAGE

The Honourable the Minister of Marine and Fisheries is the Pilotage Authority for the Pilotage Districts of Montreal, Quebec, St. John, N.B., Halifax, and Sydney, and all matters relating to pilotage in these districts are dealt with through the local superintendents at the above mentioned places.

DISTRICT OF MONTREAL

There were 52 pilots during the season of navigation, and 12 apprentice pilots in this district. During the season three pilots retired, one died; two apprentices were examined and received their branches as pilots on July 6, 1923, two new apprentice pilots were appointed. This leaves 48 pilots and 12 apprentice pilots on March 31, 1924.

The gross earnings of the 52 pilots was \$205,320.71, as compared with \$227,836.61 for 1922. Only 45 pilots, however, worked throughout the season, their average earnings were \$4,249.11, as compared with \$4,554.47 in 1922.

The total number of ships piloted inward was 1,451, of a total net tonnage of 4,177,425, and the total number outward 1,373, of a total net tonnage of 4,100,773, making a grand total of 2,824 ships of 8,278,198 net tons. This is a decrease of 143 ships and 213,469 net tons.

In this district 5 per cent of the gross earnings of the pilots is deducted for the Pension Fund (Montreal Decayed Pilots' Pension Fund) which fund is administered, without charge, for the Montreal pilots by the Department of Finance.

DISTRICT OF QUEBEC

There were 55 pilots and 8 apprentice pilots in this district during the season of navigation. During the season 3 pilots resigned, one pilot died; five apprentices were examined and received their branches as pilots on October 15, 1923. Nine new apprentice pilots have been appointed. This leaves 51 pilots and 12 apprentice pilots for the year commencing April 1, 1924.

Of the 55 pilots on the role only 47 worked throughout the season. The total earnings of all pilots was \$198,295.52, as compared with \$216,167.35 in 1922. The average earnings of the 47 pilots employed all season was \$4,045.18 as compared with \$4,128.87 in 1922.

The total number of ships piloted inward was 1,412 of a net tonnage of 5,013,487, and the total number outward 1,319, of a total net tonnage of 4,718,450, making a grand total of 2,731 ships of 9,731,937 net tons. This is a decrease of 214 ships but an increase in the net tonnage of 268,232.

In this district 7 per cent of the gross earnings of the pilots is deducted for the Pension Fund. This fund is administered by the Quebec Pilots' Corporation, and amounted on December 31, 1923, to \$93,359.33. In addition to the pension received from the corporation certain retired pilots, 39 in number, received an annual allowance from the Government of \$300.

GENERAL—MONTREAL AND QUEBEC

Mr. R. A. Williard, Montreal, is the Acting Superintendent for these districts, and Mr. F. J. Boulay, Quebec, the Assistant Superintendent.

All expenses for the pilotage services at Montreal and Quebec are paid out of public funds. This amounted, for the District of Montreal to \$9,886.86 and to \$63,088.03 for the District of Quebec, the latter including the cost of the maintenance of the pilot boat *Jalobert*.

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Early in the season the C.G.S. *Polanna* was acquired from the Federal Department of Health and renamed the *Jalobert* (one of Jacques Cartier's Masters and King's Pilot), allowing the sale of the *Eureka*. The *Jalobert* in addition to the pilotage work also attends to the Quarantine Station, doctors being attached to the ship, allowing of pratique being given to ships provided there is no contagious disease on board. This does away with delays, heretofore, to ships at Grosse Isle.

The pilot seamer also lands the mails for all eastern points, embarks and disembarks the Customs officers. Four services are therefore centralized at Father Point, which means a considerable economy to the Federal Government and satisfaction to shipping by the saving of time.

DISTRICT OF HALIFAX

There are 19 pilots and 5 apprentice pilots in this district. The gross earnings for 1923-24 was \$72,723.20. The total amount of expenses, which includes re-payment on loan for purchase of pilot boats, the payment of upkeep of the two pilot tenders, and the amount paid into the Superannuation Fund was \$16,004.76, leaving a balance to be divided amongst the pilots of \$56,729.50. The average net earnings of each pilot was \$2,985.77.

The total number of ships piloted inward was 1,167, and 1,122 outward, making a total of 2,289 ships, of a total net tonnage of 5,358,923, as compared with 2,003 ships of 4,227,279 net tons in 1922, being an increase of 286 ships and 1,231,644 net tons.

In this district 5 per cent of the gross revenue is deducted for the Superannuation Fund. This Fund is administered, without charge, for the Halifax pilots by the Department of Finance.

Captain H. St. G. Lindsay, Halifax, Superintendent, offered his resignation in March, 1924, which was accepted, and took effect on April 30.

DISTRICT OF ST. JOHN

There are 13 first-class pilots, 1 second-class pilot (1 second-class pilot was dismissed for lack of attention to duty) and two apprentice pilots in this district. One first-class pilot was retired on reaching the age limit, a second-class pilot was examined and received his certificate as a first-class pilot, the apprentice pilot was promoted to second-class pilot, and two new apprentice pilots appointed.

The gross revenue for 1923-24 was \$47,999.50, the total expenses including the upkeep of the pilot tender and auxiliary motor launch, the repayment on loan made for purchase of pilot boat, and the amount paid into the Superannuation Fund was \$14,693.95, leaving a balance to be divided amongst the pilots of \$33,305.55. Twelve first-class pilots received \$2,417.61, one received \$2,386.13, and one second-class pilot received \$1,208.80.

The total number of ships piloted inward was 454 and outward 472, of a total net tonnage of 2,235,487, as compared with a total of 960 ships and 2,329,859 net tons in 1922. A decrease of 74 ships and 5,372 net tons.

In this district 12 per cent of the gross revenue is deducted for the Superannuation Fund. This fund is administered, without charge, for the St. John pilots by the Department of Finance.

Mr. J. C. Chesley, St. John, is the Acting Superintendent.

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DISTRICT OF SYDNEY, N.S.

There are 22 pilots and 5 apprentice pilots in this district at the present time, one apprentice pilot was dismissed during the season for lack of attention to duty.

The gross revenue of the district was \$41,906.25 and the total expenses, including the amount paid into the Superannuation Fund, the up-keep of the pilot boat, and the payment on the loan for the building of the motor boat was \$11,077.32, leaving a balance of \$30,828.93 to be divided amongst the pilots and apprentice pilots. Each pilot received \$1,289.17, and each apprentice pilot \$644.59.

A new motor pilot boat has been built by the pilots at a cost of \$8,500, the money having been advanced to the pilots by the department.

The total number of ships piloted inward was 772 and outward 772, of a total net tonnage of 1,521,294, as compared with a total of 1,834 ships of a total net tonnage of 2,470,252 in 1923, a decrease of 290 ships and 948,958 net tons.

In this district 15 per cent of the gross revenue of the district is deducted for the Superannuation Fund, which is administered for the Sydney pilots, without charge, by the Department of Finance.

Captain J. D. MacKenzie, Sydney, is the Superintendent.

GENERAL

Of the thirty-six pilotage authorities constituted under the authority of the Governor in Council in pursuance of the provisions of the Canada Shipping Act, fourteen have forwarded returns for 1923.

CITADEL SIGNAL STATION, HALIFAX N.S.
RECORD of Shipping as per Record folio, from April 1, 1923, to March 31, 1924

1923-1924	Men of War British			Men of War Foreign			Steamers 1st Class			Steamers 2nd Class			Ships, Barques and Barquentines			Brigs and Brigantines			Schooners 3 Mast or bearing Private Signal			Monthly totals		
	R	A	P	R	A	P	R	A	P	R	A	P	R	A	P	R	A	P	R	A	P	R	A	P
1923																								
April.....				1	1		80	80		38	38		1	1					14	14		134	134	
May.....				2	2		58	58		50	50								11	11		121	121	
June.....				2	2		49	49		38	38								4	4		93	93	
July.....	4			8	8		58	58		41	41								8	8		119	119	
August.....	1	1		3	3		56	56		43	43								7	7		110	110	
September.....	1	1		1	1		50	50		39	39								6	6		97	97	
October.....	1	1		1	1		72	72		46	46								8	8		128	128	
November.....							69	68	1	48	48								4	4		121	120	1
December.....							87	87		28	28											115	115	
1924																								
January.....				2	2		94	94		25	25								3	3		124	124	
February.....							86	86		26	26								4	4		116	116	
March.....							82	82		23	23								6	6		111	111	
Totals.....	7	7		20	20		841	840	1	445	445		1	1					75	75		1,389	1,388	1

Total vessels reported..... 1,389
 " arrived..... 1,388
 " passed..... 1

ANNUAL REPORT ON SABLE ISLAND

H. F. HENRY, SUPERINTENDENT

The planting was started about the 15th of May, and when crop was harvested, No. 3 Station and East light had the best crop for quality. Number 4 and Main Station had a fair crop, which was much better than previous year. Total vegetables for island, 200 bushels potatoes, 30 barrels turnips, 30 barrels cabbage, ten bags carrots, parsnips and tomatoes. Remainder of seed was destroyed by sand and birds. Main Station cut sixty loads of hay, two loads of which was fine hay. Will plant hay seed at Main Station, as the two fields have run out. Should have cut twenty loads of fine hay. All other stations cut from twenty to thirty loads of hay according to the size of the station.

On November 19, at 2 p.m., barge *Pelican* was sighted by D. Johnson, staff man. Barge was then on North West bar. Shortly after West Light reported barge on bar, and thought on account of a strong west wind she would drift off. R. Naugle, Coxswain, arrived at station at 4.30 p.m. to take life boat. Life boat was not used by R. Naugle, but at 5 p.m. the surf boat was launched. While launching surf boat barge drifted off bar and commenced drifting eastward. When we boarded barge she was west of station. Finding no one on board, anchored her with her own anchor and cable. Anchor was ready to slip, but on account of darkness, had considerable trouble finding out proper ropes to cut to let anchor go. Returned to island at 7 p.m., left lantern hanging at main mast and above the rail.

On January 1, 1924, steamer *Carlsholme* reported she was on south side and ashore, and asked for life boat. Horses and life boat were ready to leave Station on the arrival of Coxswain Naugle. Half hour after he reported he was ashore. He sent a message stating he was off of bar and steaming away from island. This steamer was ashore near the wreck of the *Marshal Foch*.

During the year we had fifty-five days with fog. The island was patrolled by all stations. The ticket system is now working well. All tickets belonging to outside Stations are passed along until they eventually arrive at Main Station. There are seven ticket boxes, three on north side, three on south side and one on East bar. I receive East light tickets not more than twenty-four hours after they are deposited in box out on East bar. Other station tickets are received twelve hours after they are put in box. I now have twenty sign boards placed at intervals about island, of one mile, and pointing to the nearest station. Sign boards are arrow shape, about two feet long, with number of station painted in black.

I intend putting up more of these boards during present year, so that any one landing on island in a fog will be able to reach the nearest station quickly.

All station barns and sheds were whitewashed as far as whitewash and brushes lasted. Have ordered larger quantity this year, so we can whitewash small sheds not whitewashed last spring.

Painted inside of men's house this spring; considerable inside painting was done at our stations, also inside Superintendent's house. Painted tower at Main station this spring, with red and white trimmings; previous colour was red with green trimmings. Painted West light last summer in four days.

Shingled north side of horse barn, and patched various other sheds at Main station. Number 4 and Number 3 did considerable shingling about their stations.

Horse barn had a manure pen inside of barn. Had manure hauled away to fields; thoroughly cleaned out pen, tore out lining of pen and put in new wood lining and floor, making a large horse stall out of it. The manure is now gathered up and shovelled out through a hatch clear of barn.

C. Lucas, acting carpenter, has been doing considerable cement work about Superintendent's house and Main station in general; also put a layer of cement around East Light bridge; repaired life boat carriage; slight repairs to surf boat; made two storm windows and repaired others. All repairs being done at East light and residence are being done by carpenter, such as putting down board walk from house to light, repairing doors, windows and shingling.

The telephone line over island was in excellent order the past year, but required the two telephone boxes sent ashore for repairs last summer.

The cranberries last fall were very numerous, but on account of lack of pickers, did not pick as many as previous year. Trust I will receive new pickers as per sample sent ashore last spring. Made three pickers last fall, but they would not stand as well as those made on mainland.

Keeper Naugle lost his shaft horse last spring on account of colic. Replaced horse with one from Main barn.

Have three young horses which we are breaking to saddle and teams. Doctored two barn horses and one wild horse last May. Lost one barn horse. The other two are in excellent condition and being used; one for team and one as a saddle horse.

Two cows and one bull died on account of bloating colic; also six calves died with colic. No. 3 and No. 4 stations have calves which they are trying to rear. It seems to have been the habit in the past of outside stations, to send their calves to Main station to rear. I have put a stop to this practice. All stations must rear their own calves. The bull sent on last fall is doing nicely at No. 3 station. Gave No. 4 a bull which was reared at Main station. The general health of cows at outside stations has been very poor this winter, especially among the cows sent on from mainland, but understand the first year down here for mainland cows is very hard.

Built an addition to the pig pen, and all outside stations have built small pens. Was able to give pigs out last summer to all out stations. Gave Nos. 3, 4 and East Light, No. 2 and West Light, one pig. Had three pigs at Main station last fall to kill.

At present believe there are about 150 wild horses on island. Not more than ten died during the winter. Made a trip over island last week and saw a few fillies.

There are 42 trained horses on island and 27 head horned cattle; 7 hogs on island, and expect two litters this summer.

Have had ten life-boat drills and 12 rocket drills for the year.

Old West light fell during night of October 8 and 9, 1923. Was able to save fifteen loads of T. & G. lumber and considerable planks. Used ten loads to repair walk at East light; remainder used about station for repairs. I am still able to get wood to burn from Old West light, which I do when teams not in use for other purposes.

Killed six horned cattle.. . . .	2,456 pounds
Killed eleven hogs.. . . .	1,696 "
<hr/>	
Total.. . . .	4,152 pounds

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The following is the population of Sable Island:—

<i>Main Station—</i>	
Supt. H. F. Henry, wife, 3 children, Mrs. Jackson and Miss Henry.....	7
R. Hartlen, cook; F. Keating, boatman and horse barn; J. Blank, boatman and horse barn; W. McKenzie, boatman and cow barn; J. Booth, pig pen; C. Lucas, boatman and acting carpenter.....	6
<i>Wireless Station—</i>	
Chief operator, M. J. Walsh, wife, child and maid; assistants, G. Day, Smith.....	6
<i>No. 4 Station—</i>	
Keeper and coxswain, R. Naugle, wife and 6 children; assistants, R. Naugle, Jr., E. Naugle.....	10
<i>No. 3 Station—</i>	
Keeper, W. Blank, wife and 4 children; assistant, O. Mason.....	7
<i>No. 2 Station—</i>	
Keeper, J. Lynch, wife and 1 child.....	3
<i>East Light—</i>	
Keeper, J. Gregoire, wife, 7 children; assistant, E. Gregoire.....	10
<i>West Light—</i>	
Keeper, W. Cleary, wife and 2 children; assistant, C. Kenny.....	5
Total.....	54

REPORTS OF AGENCIES

HALIFAX, N.S., AGENCY

During the fiscal year ended March 31, 1924, this agency maintained 159 lighthouses, 70 wharves, 18 pole lights, 6 electric lights, 1 light vessel, 1 explosive fog alarm, 16 diaphones, 1 steam whistle, 45 hand horns, 2 mechanical bells, 24 combined gas and whistling buoy stations, 14 combined gas and bell buoy stations, 7 gas buoy stations, 18 automatic whistling buoy stations, 47 automatic bell buoy stations, 192 can and conical buoys, and 1,160 spar buoys.

NEW AIDS TO NAVIGATION ESTABLISHED IN 1923-24

Can buoy placed at False passage.
 Port Medway bell buoy changed to an automatic whistling buoy.
 Automatic whistling buoy placed off cape Smoky.
 Four new spar buoys at Lockeport.
 Four new spar buoys at Webber's cove.
 Six new spar buoys at Black river, Richmond county.
 Broad shoal conical replaced by a bell buoy.
 Spar buoy placed at Gull ledges, Whitehead.
 Cape Breaker bell, Canso harbour, changed to a gas bell buoy.
 Canso harbour fairway bell buoy, north entrance changed to a gas bell buoy.
 Two new spar buoys at Petit de Grat.
 One new spar buoy off Crichton head.
 Five new spar buoys at Beleine cove.
 One new spar buoy at Sheet harbour.
 One new spar buoy at Shag bay.

REPAIRS

Repairs were made to the following stations:—

Cape Race	Arichat	Devil's Island
Cape Freels	Jerome Point	Chebucto Head
St. Paul's Island	Ouetique	Chester Ironbound
Ingonish Island	Cranberry Island	Cross Island
Gillis Point	Whitehead	Port Medway
McNeil's Beach	Country Island	Green Island
Man O War Point	Bickerton	Fort Point
Cape St. George	Wedge Island	Little Hope
Scatari	Liscomb	Gull Rock
Louisburg	Beaver Island	North East Harbour
St. Esprit	Sheet Rock	Negro Harbour
Jerseymens Island	Egg Island	Pages Island

A number of the large lights have been overhauled and cleaned during the year.

NEW CONSTRUCTION

Glace Bay Lightstation.—Pole light replaced by small wooden tower.

Scattarie.—A new double dwelling was erected for keeper of the light and fog alarm stations.

Louisburg Harbour.—Rochford Point Range Lights.—A new set of range lights was built to guide vessels from the Coal Co's pier to the Louisburg ranges.

Louisburg Lightstation.—A new reinforced concrete tower and a new keepers double dwelling were built to replace combined lighthouse and dwelling destroyed by fire. New light operated on February 1, 1924.

Egg Island Lightstation.—A new single dwelling house was erected at this station for keeper and family.

Chebucto Head Storm Signal and Signal Station.—A storm signal mast also equipped for a flag signal station was put up at Chebucto head to replace the Camperdown station.

DOMINION STEAMERS

C.G.S. Lady Laurier.—Went into commission on April 3, from then until October 17, engaged in general work of agency. October 17 to 25, at agency wharf cleaning boilers. October 25 to March 31, 1924, engaged in general agency work, laid up on last date.

C.G.S. Dollard.—April 1 to 11, at agency wharf repairing and cleaning boilers. April 12, went into commission. From April 12 to June 1, engaged in agency work. June 1 to August 31, undergoing annual overhaul and repairs. From August 31 to December 14, engaged in agency work. December 15 to March 31, employed in New Brunswick agency.

C.G.S. Aranmore.—April 1 to July 7, undergoing repairs. July 8 to December 4, employed in P.E.I. agency. December 5 to December 23, employed in general work of agency. December 23 to December 31, undergoing repairs to boilers. January 1 to February 17, employed in agency work. February 17 to February 28, undergoing repairs. March 1 to 31, employed in agency buoy service.

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C.G.S. Stanley.—From April 1 to May 24, employed in agency work. From May 25 to July 24, employed in P.E.I. agency. From July 25 to April 30, 1924, laid up at agency wharf at Halifax.

C.G.S. J. L. Nelson.—Went into commission on April 1, from then till June 20, employed in agency work. From June 20 till July 15, at agency wharf undergoing repairs. From July 16 to March 31, 1924, engaged in agency work.

C.G.S. Bayfield.—April 21 to June 7, at dockyard undergoing repairs. June 8 to July 7, fitting out. July 8 to July 19, fitting tail shaft. July 20, sailed for Hydrographic Survey.

C.G.S. Arlene.—April 27 to 30, at agency wharf obtaining supplies. May 1 to July 23, under eastern Fisheries division. July 24 to 31, at agency wharf for repairs. August 1 to March 31, 1924, under eastern Fisheries division.

Trawler Vimy being converted into lightship "White Island Reef," April 1 to August 7, at agency wharf. August 8, proceeded to Quebec agency.

C.G.S. Acadia.—From April 1 to June 11, at dockyard wharf for repairs. June 12 to March 31, 1924, on Hydrographic Survey work.

PICTOU, N.S., SUB-AGENCY

Buoys after being overhauled and painted, were placed in position in the harbour and roadstead on May 22, and lifted on November 27. The service being performed by *SS. Brant*.

Marks locating the deep water channel East river were placed in position and maintained during the season by contract.

Murdoch shoal buoy reported adrift on November 10, was recovered and replaced by *SS. Brant*.

SS. Stanley made a trip to Magdalen islands with cargo, mails and passengers on May 15.

SS. Lady Grey called at Pictou for bunker coal on July 16.

SS. Arras made frequent calls during the season.

Oil was furnished to lighthouses when required.

SYDNEY, N.S., SUB-AGENCY

Material and supplies for the new wireless telegraph direction finding station on St. Paul island were secured here and shipped to destination.

An additional system of range lights was put in operation at the port of Louisburg, and a new lighthouse built there.

The ports of Sydney and North Sydney have been improved by considerable dredging and no groundings took place in either port during the season.

The service given by the wireless direction finding stations particularly the new one at St. Paul island, was much appreciated by ship masters.

DOMINION STEAMERS

The *C.G.S. Lady Laurier* of the Halifax agency made frequent calls during the season placing harbour buoys at the opening of navigation and lifting them at its close, also engaged in lighthouse supply work.

The government boats *Stanley* and *Montcalm* during the winter and spring months were employed in breaking ice and assisting steamers in bound in harbours, and in patrolling Cabot strait. This service was much appreciated by ship masters.

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SEASON'S Shipping Returns for the Ports of Sydney, Louisburg, and North Sydney

Port of Sydney—	No. of Ships	Tons
Inwards foreign.....	257	472,058
Inwards coastwise.....	1,120	924,270
	1,377	1,396,328
Outwards foreign.....	490	714,401
Outwards coastwise.....	886	687,313
	1,376	1,401,714
Port of Louisburg—		
Inwards foreign.....	137	88,248
Inwards coastwise.....	181	79,862
	318	168,110
Outwards foreign.....	149	72,110
Outwards coastwise.....	169	104,771
	318	176,881
Port of North Sydney—		
Inwards foreign.....	831	271,780
Inwards coastwise.....	962	267,463
	1,793	539,243
Outwards foreign.....	756	271,141
Outwards coastwise.....	1,047	409,921
	1,803	681,062

ST. JOHN, N.B., AGENCY

During the past year all aids to navigation in the St. John division were inspected by the Superintendent of Lights, and necessary cleaning, repairs and painting carried out at the different stations.

All told there are at present in this district 163 light, fog alarm and fog bell stations, of all classes, and also the *Lurcher* lightship, a red steel steamer with two masts, each showing a white light, equipped with diaphone, submarine fog bell, and radio telegraph apparatus, and manned by a crew of 15 men. This lightship is on Lurcher shoal, 17 miles west of Yarmouth, N.S.

CHANGES IN LIGHTHOUSE AND FOG ALARM SERVICE

Bunker Island Light, N.S.—On reef off southwest point of Bunker island, Yarmouth harbour; this lightstation was rebuilt under supervision of Engineering staff.

Economy Light, N.S.—In May, 1923, the pole light, fixed white, was moved to south side of Economy river on what is known as "Marsh Lump".

Hantsport Light, N.S.—At Hantsport, N.S., Avon river, in January, 1924, a fixed white light, 6th order lens, was installed on outer gable of warehouse, on the outer end of the government wharf.

Minasville Light, N.S.—At Minasville, Minas basin, N.S., the pole light, fixed white, discontinued in 1922, was re-established in May, 1923.

Negro Point Breakwater Light, N.B.—The occulting white acetylene light near outer end of this breakwater, west entrance to St. John harbour, was discontinued in December, 1923.

North Head Light, N.B.—A pole light, fixed red, was established at North head, Grand Manan, N.B., in January, 1924.

Oak Point, N.S.—At Oak point, St. Croix river, Minas basin, a pole light, fixed white, was established in August, 1923.

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MAINTENANCE OF BUOYS AND BEACONS

All buoys and beacons both those under contract and those attended to by dominion steamers, in the agency have been well kept up during the past year.

The following is a list of buoys maintained under contract in this division during the fiscal year 1923-24:—

Cans.....	4
Casks.....	7
Conicals.....	7
Barrels.....	4
Spherical.....	3
Dropping buoys.....	2
Spindles.....	3
Bushed stakes.....	15
Bushing.....	7 miles
Bushes.....	490
Spars.....	344

The following is a list of the buoys maintained by government steamers:—

Bell buoys.....	30
Gas and whistling buoys.....	13
Gas buoys.....	3
Gas and bell buoys.....	4
Whistling buoys.....	6
Can buoys.....	46
Conical buoys.....	44
Spar buoys.....	106

There have also been maintained:—

Iron spindles.....	20
Concrete spindles.....	1
Wooden day beacons.....	1

CHANGES IN BUOY SERVICE

Chance Harbour, N.B.—On July 9, 1923, a green can buoy was placed marking the wreck of the schooner *Senator*, western entrance to Chance harbour, St. John county, N.B.

Clarks Harbour, N.S.—A black wooden spar buoy was placed by the buoy contractor on May 10, 1923, to mark the destroyed end of the breakwater extending southward from Split (Daly's) point, Clarks harbour, N.S. This buoy will be continued until the breakwater is repaired.

Cockerwit Passage, N.S.—The red spar buoy in 3 fathoms of water off the western extreme of Horsehead Ledges, Cockerwit Passage, N.S., was replaced by a red steel conical buoy.

Grand Manan, N.B.—A black steel can buoy was established June 30, 1923, in 4½ fathoms of water off the eastern extremity of Black rock, east coast of Grand Manan island, N.B.

Memramcook, N.B.—The red conical buoy, formerly located on Fort Folly lightstation, N.B., was placed off the western extreme of Grande Anse ledge at the opening of navigation 1923, and will be maintained in that position in future.

Minudic, N.S.—The red conical buoy maintained at Minudic flats, Cumberland basin, N.S., has been discontinued.

Navy island, N.B.—The Navy island fairway can buoy situated 4 cables southward of the southeast extreme of Navy island, Charlotte county, N.B., and the black spar buoy on the end of the spit extending from the southeast extreme of Navy island were discontinued this season, and will not be placed in future.

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Port Maitland, N.S.—The fog bell at Port Maitland, Yarmouth county, N.S., was discontinued, and a red steel bell buoy established July 5, 1923, in 6 fathoms of water about two-thirds of a mile from the outer extremity of the westerly breakwater at Port Maitland, N.S.

St. John Harbour, N.B.—In the channel leading to Courtenay bay, St. John harbour, N.B., the Department of Public Works placed pile dolphins to mark the limits of the dredging near the main channel.

Yarmouth Harbour, N.S.—When the tug *John C. Stoneman*, replacing the Bunker island light, was moved to a new position in July, 1923, a temporary fairway buoy was placed to the westward of the steamboat course in the channel, Yarmouth harbour, N.S., abreast of the former position of the Bunker island light.

CONSTRUCTION WORK

Apple River Light and Fog Alarm, N.S.—A type "B" diaphone equipped with three pistons was installed here in place of old diaphone.

Bay View Life Saving Station, N.S.—This station on Digby gut was overhauled, repaired, and completely fitted out.

Head Harbour Light.—The old wooden sea wall at the base of the lighthouse was replaced by a concrete wall.

Red Head, N.B.—A new wooden dwelling was erected for one of the assistants at the Red head direction finding station.

OBSTRUCTIONS REMOVED

The wreck of the *Maid of Scotland* rammed by the Peruvian steamer *Perene* and sunk near the fairway buoy at entrance to St. John harbour was removed.

Sunken logs obstructing the channel into Weymouth were removed.

Several large rocks obstructing the channel into Seal cove, Grand Manan, N.B., were removed.

REPAIRS TO WHARVES

Repairs were made to the following wharves in the agency during the past year: Canada creek wharf, N.S.; Carrsbrook wharf, N.S.; Church point wharf, N.S.; Comeau cove, N.S.; repairs to wharf and breakwater, Digby wharf, N.S.; Kingsport wharf, N.S.; Lorneville wharf, N.B.; Marine dock, West St. John, N.B.; Meteghan cove, N.S.; breakwater, Pickett's wharf, N.S.; Shag harbour, wharf, N.S.; Tiverton wharf, N.S.; Westport wharf, N.S.; wharves general west side St. John, N.B.; White bluff wharf, N.B.

During the year there were under the agency's supervision 133 wharves.

LIFE-SAVING SERVICE

The life-saving stations at Bay View, N.S., and Little Wood island, N.B., were inspected several times during the season and all necessary repairs made to them.

The Little Wood island life-boat carried water, mail, and supplies to Gannet rock light and fog alarm station, and also delivered water, mail, and supplies to Machias Seal island light and fog alarm station.

Extensive repairs were made to the lifeboats of these stations during the past fiscal year.

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PARTRIDGE ISLAND SIGNAL STATION

		Tonnage
Steamers signalled.....	38	84,515
Sailing vessels signalled.....	12	three-masted schooners..... 4,687
	6	four-masted "..... 3,601
	1	man of war.....
	57	vessels
58 signals answered at Partridge island.		92,803
1 signal answered calling for tug boat.		

MOVEMENTS OF VESSELS

C.G.S. Aberdeen was constantly employed during the year (except when laid off for necessary repairs) in the lighthouse and buoy service under the New Brunswick agency, up to October 13, 1923, when she stranded on the Limb ledge (Seal island, N.S.) and became a total wreck.

C.G.S. Dollard.—Arrived at St. John, N.B., to take the place of the wrecked *Aberdeen* on November 20, 1923, employed in lighthouse and buoy service under the agency until December 2, returned to Nova Scotia agency on that date. On December 13, resumed work under the St. John agency, in lighthouse and buoy service until the close of the fiscal year 1923-24.

C.G.S. Laurentian.—Employed during the fiscal year (except when laid up for repairs) in agency work in the lighthouse and buoy service, and in landing coal, oil, and supplies at the different lighthouse and fog alarm stations.

QUEBEC AGENCY

NEW CONSTRUCTION

A new keeper's dwelling was built at Cap Chat. A storm signal station was established at Cap aux Os. A steel tower was erected at point Nicholas for the Signal Service. New range lights established at Johan Beetz bay and Petite Vallee. A new keeper's dwelling built at Southwest point, Anticosti. New range lights established at Quetachua bay, and Riviere St. Francois.

REPAIRS

Repairs were made to tower and shed at Bagot bluff, and to keeper's dwelling and fog alarm building at Fame point. Repairs were made to tower, barn, general storehouse, workshops and sailors' home at Southwest point, Anticosti. Repairs also were made to a number of wharves in the district.

WHARVES

During the past year, the Quebec agency has under its control 72 wharves, three new wharves having been transferred from the Department of Public Works to the Department of Marine and Fisheries, these were wharves at Beaupre, Montmorency county, Cape cove, Gaspé county, and Rivière-au-Renard, Gaspé county.

The wharf at St. Nicholas was leased to the municipality of the parish of St. Nicholas, and the wharf at Levis to the firm of P. Robitaille of Levis.

MOVEMENTS OF VESSELS

C. G. Icebreaker *Mikula*.—On May 13 left for gulf of St. Lawrence to engage in ice patrol work in Cabot strait, in connection with icebreaker *Montcalm* returned to Quebec on June 13, until the fall laid up and undergoing

repairs—during winter engaged in icebreaking work, and on January 31 made trip to Seven islands and Ellis bay, Anticosti island, with passengers and freight, returning to Quebec on February 10, from then until February 26, engaged in icebreaking above Quebec—laid up on February 26 for balance of fiscal year.

C.G.S. Montcalm.—At the beginning of fiscal year, engaged in icebreaking operations above Quebec, between April 22 and June 13, on patrol duty, Cabot strait. From July 4 to August 2, engaged in lighthouse supply trip to Anticosti island and Gaspé coast, from then till December 17, employed in general work—left Quebec on December 17 for North Sydney, C.B., where she remained till the close of the fiscal year.

C. G. S. Druid.—Went into commission on April 11, from then until the close of the year, employed in general buoy service work from Platon to Father point, a distance of 185 miles.

C G. S. Loos.—At the end of April, was engaged in the embarking and disembarking of pilots at Father point, taking the place of the regular pilot tender. On the 29th of May, entered dry dock for 8 days for repairs, during the rest of the year until December 17, when she laid up for the winter, employed in lighthouse supplies, construction, and buoy service work in the district.

MONTREAL AGENCY

The total expenditure for the fiscal year 1923-24 amounted to \$337,471.53; this was an increase of \$38,302.16 over the 1922-23 expenditure, due mainly to extensive repairs to Dominion steamers especially the *Shamrock*.

No new construction work done during the season.

DOMINION STEAMERS

C.G.S. Argenteuil.—Used for buoy service, lighthouse supplies, and repair work on upper reaches of St. Lawrence also lake St. Louis, and Ottawa, Richelieu, and Rideau rivers.

C.G.S. Berthier.—Used in connection with rush of buoy service work in the spring and fall.

C.G.S. Bellechase.—Used in connection with rush of buoy service work in the spring and fall.

C.G.S. Contrecoeur.—Was used for some months on the opening of navigation in place of the *Shamrock* undergoing repairs.

C.G.S. Emelia.—Transferred from the Ship Channel branch to the agency, was practically rebuilt, and was used throughout the season in painting of high lights, buoy service work, and repairs to light-stations.

Tug James Howden.—Used in connection with the rush of buoy service work in the spring and fall.

Tug Laviolette.—Used in connection with the rush of buoy service work during the spring and fall.

C.G.S. Shamrock.—Busily engaged throughout the season in general buoy service work, and lighthouse supply work.

C.G.S. Vercheres.—Occupied during the season in the towing of construction scows, and for buoy service work, also patrol and inspection work, and recharging shore stations with gas.

Tug Varennes.—Used during spring and fall in the rush of buoy service work.

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CHARLOTTETOWN, P.E.I. AGENCY

NEW CONSTRUCTION

During the past year new lights were established at cape Rouge, C.B., Haldiman Gully ranges, P.E.I., and Burnt Church wharf, Miramichi bay, N.B.

A new fog alarm station was completed and put in operation at Entry island, Magdalen islands.

At cape Norman, Nfld., the fog alarm apparatus was changed from steam to oil.

A new dwelling was built at East Point, P.E.I.

During a very severe storm, last October, a number of lights were demolished and a great deal of protection work was carried away necessitating a good deal of extra work.

GOVERNMENT STEAMERS

C.G.S. Brant.—From April 28 to May 10, crew fitting out ship at Georgetown, went into commission on May 11, from then until December 20, when she laid up for the winter, employed in general lighthouse and buoy service in the district.

C.G.S. Aranmore.—Left Halifax for this agency on July 9, 1923, from that date until December 3, when she returned to Halifax, was employed in general work in the district, except for the period September 3 to September 21, when she was laid up, to be cleaned and painted.

C.G.S. Montcalm.—Employed in the agency in buoy service work from June 2 to June 7, and in towing schooner *Evelyn V. Miller* to Souris from January 5 to January 8.

C.G.S. Stanley.—Arrived at Charlottetown on May 25, employed in the district in lighthouse supply and buoy service until June 14, when she sailed for Halifax. Returned to Charlottetown July 13 for work on Charlottetown Pictou route, and returned to Halifax on July 23.

VICTORIA, B.C., AGENCY

Agency work during the fiscal year ended March 31, 1924, embraced supervision and maintenance of all aids to navigation, upkeep of public wharves, and the purchasing and forwarding of all supplies for the agency and for the Radiotelegraph and Hydrographic Survey branches of the Marine Department.

NEW CONSTRUCTION

New fog alarm stations were built and machinery installed at Entrance island, Quatsina sound, and at Merry island. Welcome passage, the former was put in operation on December 10, 1923, and the latter will begin operating about the middle of April, 1924.

A gas and whistling buoy, 9½ type was placed off the entrance to Sydney inlet on September 6, 1923. This is an important aid to navigation. A number of new buoy and beacon lights were also established during the year, viz: new gas buoys at Sydney inlet, Nanaimo harbour, Sutton rock; new gas beacons at Roberts point, Five Mile, Seven Mile, Nine Mile, Eleven Mile, Harrops, Pt. Upwood, and Tucker bay.

Necessary repairs were made to several lightstations, and the outside of the dwelling house at Pachena was completely resheathed.

LIFE-SAVING STATIONS

The life-saving stations at Banfield and Clayoquot were efficiently manned and maintained.

The installation of the Direction Finding station at Pachena has been of great assistance to vessels. Patrol men were employed at the Carmanah, Pachena, and Cape Beale light-stations early in November, to act as assistant lookout men, and patrol the coast line.

Wireless telephones were established at Carmanah, Pachena, and Cape Beale light-stations, and the Banfield life-saving station. Wireless telegraph sets was also installed at Lennard island lightstation, and the Clayoquot life-saving station.

These improvements have increased the general efficiency of life-saving work on this coast.

CASUALTIES

In the early morning of February 27, the Norwegian steamship *Tatjana* went ashore on Village island, Barclay sound, no lives lost, the crew being taken off by the Banfield lifeboat. On the night of December 24, the tug *Tyee* with an empty scow in tow foundered in Peddler bay during a heavy gale. The captain and two of the crew went down with the vessel.

DOMINION STEAMERS

C.G.S. *Estevan*, March 31-June 9, undergoing annual inspection and overhaul.

June 9-July 25, coaling ship and proceeded to west coast stations with annual supplies. Mr. Halkett, Superintendent of Lights, on board making inspection of light stations.

July 26-27, replacing Gossip Reef bell and gas buoy in position.

July 27-August 4, blowing down boilers.

August 7-September 12, employed landing construction material for the new fog alarm at Quatsino station and overhauling of west coast gas buoys.

September 12-24, blowing down boilers.

September 25-December 3, in Prince Rupert agency overhauling large buoys in that district.

December 3-10, undergoing repairs.

December 11-29, landing Christmas supplies on west coast.

December 29-January 14, recharging gas buoys in strait of Georgia.

January 29-February 8, landing construction material for new fog alarm at Merry island.

February 11-March 4, exchanging lightkeepers at Ballenas, Sisters, Carmanah and Pachena stations.

March 6-12, overhauling large gas buoys in strait of Georgia.

March 12-24, boilers blown down.

March 24-31, landing material for Radiotelegraph service on the west coast.

C.G.S. *Berens*, March 31-April 14, employed overhauling unlighted buoys and acetylene beacons in passages along the north shore of gulf of Georgia.

April 14-21, employed taking the Superintendent of Lights for an inspection trip among the lightstations in the gulf of Georgia.

April 23-May 12, working under the supervision of Mr. Trowsdale, General Construction Foreman, on repair work at Yellow rock and Prospect point stations.

May 12-14, landing oil and supplies at Carmanah point station.

May 17-23, working on aids to navigation in Burrard inlet.

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May 25-June 7, overhauling aids to navigation on Fraser river.

June 7 to July 3, receiving annual overhaul.

July 3-12, attending to aids to navigation in gulf of Georgia, also loading lumber and other material at Prospect point and Saturna island light stations.

July 12-14, installing temporary keeper at Pachena lightstation.

July 15-August 4, working with aids to navigation on the Fraser river.

August 4-13, landing annual supplies of oil at stations in the vicinity of Victoria.

August 14-19, working on aids to navigation in Burrard inlet.

August 21-September 1, landing annual supplies at lightstations in gulf of Georgia.

September 1-8, taking the Superintendent of Lights to different lightstations in gulf of Georgia.

September 9-October 4, working in the gulf of Georgia under the supervision of the Superintendent of Lights.

October 8-13, recharging acetylene lights in gulf of Georgia.

October 14-24, establishing new spar buoys in gulf of Georgia, and Courtenay river.

October 24-November 1, bringing oil from Vancouver.

November 1-13, having new cylinder installed and other repairs carried out.

November 13-29, landing material for construction of new fog alarm at Merry island.

December 1-21, landing supplies for gulf stations.

December 21-January 9, vessel laid up.

January 10-20, recharging acetylene lights.

January 21-24, overhauling spar buoys in straits of Juan de Fuca.

January 25-February 9, overhauling buoys in gulf of Georgia.

February 11-18, landing supplies at Merry island and establishing new Aga lights in gulf of Georgia.

February 19-23, working on Fraser river acetylene lights.

February 24-March 4, working at Calamity point beacon.

March 10-16, landing material at Merry island and other gulf stations.

March 17-31, working on aids to navigation in Vancouver harbour.

C.G.S. *Newington*, August 27.—Arrived from Prince Rupert.

September 4-8, left for the west coast with distillate and supplies for lightstations as far as Estevan point.

September 8-19, hauled out for cleaning and repairs.

September 19-27, landing men and material for Direction Finding station at Pachena point.

September 27-October 5, hauled out to replace broken propeller.

October 5-November 3, landing fog alarm machinery at Quatsino.

November 3-21, landing oil and other supplies for Radiotelegraphs department and Life Saving service on west coast.

November 21-27, blowing down boilers.

November 27-December 16, left for west coast to overhaul Clayoquot buoys and establish an Aga light on Sutton rock.

December 18, left for Prince Rupert.

PRINCE RUPERT, B.C., AGENCY

The general work of purchasing and delivering supplies to lightstations, maintaining aids to navigation and government steamers, supervising construction and making repairs at lightstations, etc., and general supervision of wharves, has been carried out during the past fiscal year by the office and outside staffs.

NEW CONSTRUCTION

A day beacon was built on Amur rocks, Queen Charlotte islands.

An Aga lighted beacon was erected on Sunny island, at junction of Johnson and Fisher channels.

An Aga lighted beacon was erected on Donald point, Return channel.

An Aga lighted beacon was erected on Beaumont island, Johnson channel.

A day beacon was erected on Law island, Return channel.

A day beacon was erected on Hyndman's reefs, Return channel.

Day beacons were erected on Picture island and Magee island, Gunboat passage.

A day beacon was erected on Sloop islet, Massett inlet.

A day beacon was erected on Mackie rock, Massett inlet.

A lighted Aga beacon was erected on Hattie island, Portland canal.

An Aga light was placed on Cook point day beacon, Massett inlet.

An Aga lighted beacon was erected on Ramsden point, Portland canal.

An Aga lighted beacon was erected on a dolphin on Salmon river flats, Portland canal.

LIGHTS, FOG ALARMS, ETC.

All lights and fog alarms, and all lighted and unlighted aids to navigation in the district were maintained in proper order throughout the year.

GOVERNMENT WHARVES

The six Government wharves in the district under the jurisdiction of the agency are located at Stewart, Alice arm, Spiller river, Refuge bay, Massett, and Queen Charlotte city; all these have been regularly inspected and reports made on them, with the exception of the one at Spiller river which has been officially closed to traffic.

DOMINION STEAMERS

C.G.S. Estevan.—Arrived at the agency on October 6, and was employed in lighthouse supply and buoy service work until the 20th of November.

C.G.S. Newington.—During the months of April, May, June, July and August—employed in the routine lighthouse and buoy service work of this agency.

During September, October, and November, she operated under the Victoria agency, and up to the middle of December when she was again transferred to the Prince Rupert agency for the balance of the fiscal year.

C.G.S. Birnie.—From the beginning of April, 1923, to end of March, 1924—employed in agency work.

Launch Rhona.—With the exception of time for overhauling, was engaged throughout the year in transferring from Prince Rupert to the agency at Digby island, mail, supplies, and passengers making two to three regular trips every day.

DOMINION LIGHTHOUSE DEPOT, PRESCOTT, ONT.

As usual a good deal of work was performed at the depot in connection with the manufacture of lighthouse materials and apparatus, fog alarm materials, etc., for the various departmental agencies and Dominion light-stations. Work in connection with the proper maintenance of lighthouses, beacons, gas and other buoys, was carried out in the Prescott division during the season.

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Necessary repairs were made throughout the season to the engines, hulls, etc., of the Government steamers *Scout* and *Concretia*, and to the Dominion Lighthouse Depot plant.

Machine Shop Department.—Of the 143 orders issued to this department, 123 were completed and quite an amount of work done on the unfinished orders, despite the fact that this department was short of skilled machinists.

These orders included repairs to Government steamers and depot plant, and making of vapour supply parts, and buoy materials, repairing of lanterns and preparing all forms of lighting apparatus for the various agencies.

Coppersmith and Tinsmith Shop Department.—Of the 87 orders issued to this shop during the fiscal year, nearly all were completed. These orders included the making of oil tanks, preparing and repairing lighthouse apparatus and all coppersmith and tinsmith work in connection with repairs to the Government steamers *Scout* and *Concretia* and the depot plant.

Carpenter Shop Department.—Effected necessary minor repairs to hulls of steamers *Scout* and *Concretia* during the season of navigation, and to the depot plant buildings, made gas and bell buoy superstructures, packing cases and crates for shipment, cupboards, etc.

Paint Shop Department.—Necessary painting was done to the Prescott division government steamers *Scout* and *Concretia*, to lighthouse apparatus, buoy superstructures, buoy and lighthouse lanterns, etc., and to the buildings and fences of the Dominion Lighthouse Depot plant.

Brass Foundry Department.—Orders for 38 brass castings for lighthouse apparatus, buoy superstructures, fog alarm materials, headlight lanterns, buoy lanterns and radio structural materials, etc., were completed during the fiscal year, and all castings for steamers of the division and the depot plant.

Blacksmith Shop Department.—Attended to all work in connection with buoy superstructures, repairs to *Scout* and *Concretia*, necessary forgings for materials manufactured in the machine shop, and those received for repairs from the various agencies and lightstations, also to all blacksmith work in connection with the depot plant.

Shipyard Department.—All gas and conical buoys stored on Prescott depot dock were scraped, cleaned, and painted. Railway cars in yards were loaded and unloaded.

Freight was transported to and from depot.

Heavy labour was supplied to shops as required.

Depot grounds and docks were kept in good condition.

Concrete anchors and spar buoys were prepared.

Gas Test Room Department.—Prescott division buoy and lighthouse lanterns were overhauled and tested.

An Aga stake light with fittings was prepared for Whitby station.

A number of buoy lantern occulting boxes from Prince Rupert, B.C., and Montreal agencies, were overhauled and put in order.

All Pintsch gas shipments received at Depot were measured up and reported on.

Erectors from this department were sent out in connection with the proper maintenance of buoys and gas beacons in Prescott division.

As usual a number of gross flash burner gaskets, purifier door gaskets, carbide door gaskets, diaphragms, etc., were turned out for a number of different agencies.

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Packing and Shipping Department.—Shipments to the number of 483 all carefully sorted and packed were sent out from the depot during the last fiscal year including all forms of lighting apparatus, buoy structures, fog alarm plants, lighthouse supplies, etc.

All cases and packages were numbered and addressed, and shipping lists prepared.

Goods received at depot were unpacked, checked, and assigned to proper places.

Second hand materials received were unpacked, examined, and prepared for valuation.

Photometric Room.—In this room tests were made during the year of all samples of oils from the various agencies, light-stations, and commercial firms and reports submitted of all tests. Oil consumption tests were made with the Sun Hinge and Marcy burners, also tests of reflectors with oil burners.

Pattern Shop Department.—All patterns belonging to the depot were kept in good condition and properly stored.

Records were kept of patterns shipped from the depot, and a number of patterns were made up.

Drawing Office.—During the year eight drawings were made and also sketches to accompany requisitions forwarded to Purchasing Agent for materials, clockwork and other apparatus were tested, goods received for depot examined, and the Pattern Shop supervised.

DOMINION STEAMERS

C.G.S. Concretia.—Was fitted out at Prescott early in April, and went into commission April 19th, she maintained lights west of Prescott in District No. 6, and charged and placed the gas buoys in western part of District No. 6, and kept all buoys in proper condition, assisted in installing a new Pintsch gas light at Grenadier island, in the building of a new lighthouse pier at Brighton, and in effecting repairs at Brighton lights, False Ducks, and South Bay Point light-stations, delivered lighthouse supplies, and inspected Government wharves, was laid up at Prescott on December 19, 1923.

C.G.S. Scout.—Was fitted out at Prescott in the early part of April, 1923, and went into commission on April 18, was in charge of maintenance of lights east of Prescott in district No. 6, charged and placed all gas buoys east of Prescott, attended unwatched beacon lights from Prescott to Coteau, and kept in proper order all buoys in her division; assisted the Hydrographic Survey in taking soundings and placing new can buoy on Jackass shoal, and rearranging buoys at Dickinson landing. Delivered all lighthouse supplies to stations east of Prescott, and visited and inspected government wharves, removed gas buoys at close of season and placed markers.

Went out of commission on December 19, 1923, and was laid up at Prescott.

PARRY SOUND, ONT., AGENCY

All Parry Sound unwatched lights were maintained, and the buoy service in the inner channel between Parry Sound, Wabauskene, Fesserton and Cold-water attended to by the staff.

During the winter of 1924, 62 Pintsch and Aga buoy and beacon lanterns were overhauled and tested, and 17 gas buoys and 4 iron buoys other than gas; all floating aids were charged and put in condition for the opening of navigation.

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DOMINION STEAMERS

C.G.S. Grenville.—April 30, inspected by steamship inspector.

May 2-June 29, engaged in lighthouse supply and buoy service in district.

Commenced annual trip on June 29, and completed it on September 1, as detailed below.

LAKE ERIE AND CONNECTING RIVERS

June 30-July 20, supplied and inspected all stations, lightstations and buoy services in this section.

LAKE HURON AND LOWER PART GEORGIAN BAY

July 21-August 2, supplied and inspected all stations and buoy services in this section.

August 4-August 6, went from Parry Sound to Sault Ste. Marie, inspecting odd stations on the way.

LAKE SUPERIOR

August 7-August 26, supplied and inspected all stations and buoy services in this section.

ST. MARY'S RIVER, NORTH CHANNEL AND UPPER PART, GEORGIAN BAY

August 27-September 1, supplied and inspected all stations and buoy services in this section.

For balance of season employed in connection with lighthouse and buoy service in Parry Sound district proper. From December 1 to close of navigation removed all buoys and light keepers in the Parry Sound district proper. Laid up at Midland on December 20.

C.G.S. Murray Stewart.—May 30, inspected by steamship inspector. Commenced work on June 1, and was for the most part employed in buoy and lighthouse work in the district during the season, during the absence of the *Grenville*.

In October and November towed scow *Parry Sound* to Amherstburg in connection with buoy service there.

During December removed all keepers in east end of lake Superior, completed this work on December 18, and laid up at Sault Ste. Marie for the winter. List of buoys maintained by both steamers and launch *Shoepack* during the season

Iron buoys other than gas	Gas buoys	Spars	Day Beacons
3 Bell.....	Bennett Bank.....	263	49
1 Conical.....	Cove Island.....		
—	Campana Shoal..		
4	Hooper Island.....		
	Hall Rock.....		
	Kennedy bank.....		
	Key Inlet Entrance.....		
	Lone Rock.....		
	Lockerbie Rock.....		
	Lottie Wolf.....		
	Magnetawan Ledges.....		
	Port McNicoll.....		
	Surprise Shoal.....		
	Seguin Bank.....		
	Sawlog Point.....		
	Three Star Shoal.....		
	Vails Point.....		

Totals:—284 buoys and 49 beacons.

FORT WILLIAM, ONT., SUB-AGENCY

Icebreaking was carried on as usual.

On April 17, a new Aga light was installed on southwest end of Bare point breakwater and put in operation on May 4.

On May 4, all shore lights were put in operation including Port Arthur and Fort William main lights.

Mission entrance has a set of electric ranges, and Pie island an Aga light.

On May 5, first vessels arrived from the east, ss. *Glenisla* at Fort William, and ss. *Glenshee* at Port Arthur.

On May 6, all spar buoys, numbering 41, were placed in position at Port Arthur and Fort William.

On May 13, three gas and bell, and two gas buoys were put in position.

On July 10, work was started on a lighthouse and dwelling on Shaganash island—work completed on November 7.

On August 9, work was started on a lighthouse, fog alarm building, and dwelling on Trowbridge island—work not quite completed.

August 18, ss. *Grenville* arrived at Port Arthur after supplying lightkeepers in this district; left for the east on August 22.

December 12, made special trip on *Strathbogie* with provisions for lightkeepers.

December 18, all gas, and gas and shell buoys were lifted and brought ashore.

December 23, steamer *Jenkins* last vessel to clear for eastern ports.

Very little ice in harbours at close of navigation not over 6 inches in the clear.

December 25, all lightkeepers were brought ashore from Slate, Battle, Lamb, and Shaganash islands, Passage island, U.S.A., point Porphyry, Tunder cape, Welcome and Victoria islands.

REPORTS OF HARBOUR COMMISSIONERS

MONTREAL HARBOUR COMMISSION

PERSONNEL

The personnel of the Montreal Harbour Commission for 1923 was: President, W. L. McDougald, Esq., Commissioners, Emilien Daoust, Esq., and Milton L. Hersey, Esq.

Officials

M. P. Fennell, Jr., General Manager and Secretary.

Thos F. Trihey, Assistant to the Secretary.

Paul LaRocque, Treasurer.

George E. Smart, Comptroller.

Thos. W. Harvie, Chief Engineer.

F. W. Cowie, Consulting Engineer.

Paul Leclaire, Assistant Chief Engineer.

G. R. Dalkin, Mechanical Engineer.

T. E. Salter, Electrical Engineer.

Capt. J. F. Symons, Harbour Master.

Capt. D. J. Perrault, Deputy Harbour Master.

Robt. A. Eakin, Paymaster and Wharfinger.

J. Vaughan, Superintendent of Railway Terminals.

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R. L. Mercier, Assistant Superintendent of Railway Terminals.
 M. Peterson, General Superintendent of Grain Elevators.
 Geo. Gendron, Mechanical Superintendent.
 I. C. Franklin, Manager of Cold Storage Warehouse.
 L. H. A. Archambault, Purchasing Agent.
 P. E. Morant, Supervisor of Customs Wharfages.
 Lieut.-Col. E. A. Williams, Chief of Police.

FINANCIAL

The income on revenue account for 1923 was \$3,721,159.99; the cost of operation, maintenance, interest, sinking fund, etc., was \$3,630,324.86; leaving a surplus to the credit of revenue account for the year of \$90,835.13.

ACCOMMODATION

During 1923 the accommodation and facilities of the port were increased by a vigorous resumption of wharf construction, more or less in abeyance during the last six years; the construction of the new elevator No. 3 and the linking up of it with the Harbour Railway system, harbour roadways, and approaches to the city, and with the lake vessels, etc., and the extension of Grand Trunk elevator "B" at Windmill point, and provision for four additional grain berths.

ENGINEERING DEPARTMENT

The following were the principal items of construction undertaken during the year:—

Construction of Elevator No. 3 and five new grain loading berths at the Tarte pier.

Extension of Elevator "B" and four additional grain berths at Windmill point.

Completion of extension to Alexandra pier.

Completion of extension to King Edward pier.

Extension of shore wharf, section 30.

Construction of marine tower jetty at new Elevator No. 3.

Extension of Bulkhead wharf in front of new Elevator No. 3.

Completion of extension to Imperial Oil wharf at Montreal East.

Completion of sawmill and timber storage shed, and erection of transformer house on Bickerdike pier.

Erection of new transit sheds Nos. 26 and 27.

Erection of new wharf office building at Victoria pier.

Erection of new machine shops and installations of equipment and machinery in same, at Harbour yard, Notre Dame street east.

Dredging approach channel for Bickerdike pier extension.

The laying of additional sidings on the Bickerdike pier and vicinity for the use of the Canadian National Railways, Canadian Import Co., and British Empire Lumber Corporation.

Improvement of track layout at west end of Elevator No. 2.

Enlargement of flood gate opposite east end of Elevator No. 2 and railway connection made between tracks outside of flood wall and harbour main lines.

Extension of tracks to serve new shore wharf as Sections 27 and 29.

Improving existing tracks and laying additional sidings at Dominion Coal wharf, Section 37.

The removal of original low level tracks and the formation of a railway ramp and railway yard for Elevator No. 3.

A railway siding for the Dominion Tar and Chemical Co. at Section 62.

A spur for the Hospice St. Benoit at Section 79.

Completion of double diamond railway crossing and consequent rearrangement of intersections at Canada Cement Company's wharf at Montreal East.

Construction of retaining wall forming south side of ramp at Papineau avenue subway.

Extension of Aylwin street subway and construction of east-and-west wing retaining walls to form north side of future ramps.

Diversion of Nicolet street sewer.

Formation of new paved roadway from the north end of Bickerdike pier to Mill street.

Paving of roadway behind sheds 24 and 25 and leading to eastern entrance of the Cold Storage warehouse.

The installation of a 20-ton auto truck scale on Victoria pier.

The extension of the water main on Bickerdike pier and at sections 26 and 27.

Widening of the main channel in the central harbour.

Completion of electrification of the eastern section of the railway system and the commencement of electrification of the western section.

Extension of power transmission lines from the power house at section 23, around Windmill point basin to the north end of Bickerdike pier, serving Elevator "B" and the coal and timber plants, and also from the harbour yard to new Elevator No. 3.

Extension of harbour lighting system at Windmill point basin, Bickerdike pier and Victoria pier.

New transformer house at Elevator "B."

Commencement of relaying of main lines and spurs to piers from McGill street to Victoria pier with 101 pound rails, preparatory to electrification.

The general maintenance of berths, channels, wharves, railways, roadways, sewers, water service, scavenging, lighting, hoists, bridges, subways, flood gates, etc., was carried on as usual.

NEW GRAIN ELEVATOR NO. 3

In order to relieve congestion in the upper part of the harbour, and as Tarte pier was the only high level one completed in the lower part, and future development will be in that vicinity it was decided that Tarte pier should be the site for the new elevator.

The capacity of the new elevator is 2,000,000 bushels. It consists of a car unloading shed, a receiving house, two storage houses, two shipping houses, four travelling marine towers and conveyer galleries leading to five ocean steamer berths. The main buildings are on the wharf between Tarte and Laurier piers with the car unloading shed on the north side, and a fifty-foot roadway on the south or quay side.

The four travelling marine towers are on a jetty extending out from the quay between Tarte and Laurier piers.

The capacity of the east storage house is 1,017,000 bushels and of the west one 904,000 bushels.

Shipping to ocean boats may be at rate of 120,000 bushels per hour, by eight conveyers leading to steamer berths, two on each side of Tarte pier and one on wharf between Tarte and Sutherland piers. Each shipping conveyer has a capacity of 15,000 bushels per hour.

Shipping to railroad cars is made from two car spouts, in the car unloading shed, the spouts being fed either by the receiving house scales or by shipping house belt conveyers. Provision is made for the building of a storage

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house to the north, and for shipping berths on Laurier pier, and on Sutherland pier. The receiving house, the two shipping houses, the four marine towers, the conveyer galleries, and the car unloading shed are of structural steel framework, with concrete floors and roofs.

The entire plant is designed to minimize the hazard of dust explosion.

EXTENSIONS TO ELEVATOR "B"

These comprise an addition to the storage house, a shipping house at the west end of the storage, shipping conveyers to four ocean steam berths served by four streams of grain from the new shipping house, a new marine tower to the west of the old tower, an addition to the working house cupola, and a new power house between the working house and the storage.

The shipping house, shipping galleries, marine tower and addition to working house cupola are of structural steel framework with concrete floors and roofs with corrugated iron siding.

The power-house is a reinforced concrete structure in which are the switchboards and control panels for all the electric power, lights and signals throughout the plant.

In all this new construction precautions were taken to minimize the hazard of dust explosion.

COLD STORAGE WAREHOUSE

There has been an increasing demand for space in this warehouse during 1923, and it is becoming to a greater extent a factor as a means of marketing and distribution for the Canadian producer.

The accompanying tabulated statement shows the increased storage of products in 1923 as compared with 1922:—

	1923	1922
Apples.....	43,970 brls.	30,000 brls.
Butter.....	2,957,864 lbs.	1,672,000 lbs.
Cheese.....	26,235,450 "	13,250,000 "
Eggs.....	1,806,450 doz.	1,200,000 doz.
Frozen and pickled fish.....	1,222,229 lbs.	850,000 lbs.
Meat.....	4,633,065 "	1,500,000 "
Poultry.....	839,807 "	500,000 "

Apart from the above commodities the fur dealers of Montreal made extensive use of the plant at one time during the summer of 1923 upwards of one million dollars worth of furs were in storage. The plant was also extensively used for the storage of hops, and a number of varieties of fruits and vegetables.

DREDGING AND FILLING

Dredging operations began on the 7th of May by the dredge *John Kennedy*, by the middle of June a fleet of three dredges and five derricks with their attendant tugs were operating and continued till the close of the season.

Towards the close of the season in order to cope with the work, the working hours of a number of the vessels had to be considerably extended.

Apart from the preparing of crib sites new dredging was confined to the Bickerdike pier extension and the widening of the channel in the central harbour.

Dredging during the season amounted to rock dredging 246,125 cubic yards; other material 131,585 cubic yards; total of dredging 377,710 cubic yards.

The filling corresponded to the dredging.

All obstructions of any consequence in the main portion of the harbour, from the head of Windmill point basin to the end of Victoria pier, were removed, and a considerable amount of maintenance dredging was done at Tarte pier and Dry Dock basin.

GRAIN ELEVATOR SYSTEM

The total of all grains from the port of Montreal for the season of 1923 amounted to 120,107,990 bushels, and Montreal thus for the third successive year takes the leading place among the world's grain ports.

The total export of grain from Montreal in 1922 amounted to 155,035,817 bushels, the falling off in 1923 was due largely to the almost complete stoppage of the export through Montreal of American corn, and a cut in the export of American rye of about 50 per cent.

RECORD OF RECEIPTS AND DELIVERIES OF THE HARBOUR COMMISSIONERS' GRAIN ELEVATOR SYSTEM FOR 1923

Elevator No. 1—Capacity 4,000,000 bushels.
First vessel unloaded May 7, 1923.
Last vessel unloaded December 1, 1923.

RECEIPTS

Water	38,151,284 bushels from 500 steamers and 38 barges.	
Rail	9,075,775 " from 5,124 cars.	
Total	47,227,059 "	
Canadian grain.....		32,814,545 bushels.
American grain.....		14,412,514 "

DELIVERIES

Conveyer.....	43,934,042 bushels	
Cars.....	1,640,303	"
Teams.....	710,370	"
Bags.....	1,411	"
Total.....	46,286,126	"

Elevator No. 2—Capacity 2,662,000 bushels.
First vessel unloaded May 7, 1923.
Last vessel unloaded Dec. 10, 1923.

RECEIPTS

Water	26,462,156 bushels from 390 steamers and 46 barges.	
Rail	19,271,020 " from 10,657 cars.	
Total	45,733,176 "	
Canadian grain.....		32,717,640 bushels
American grain.....		13,015,536 "

DELIVERIES

Conveyer.....	42,805,715 bushels	
Cars.....	1,317,906	"
Teams.....	864,124	"
Bags.....	1,282,289	"
Total.....	46,270,034	"

Elevator "B"—Capacity 3,500,000 bushels.
First vessel unloaded May 18, 1923.
Last vessel unloaded December 5, 1923.

RECEIPTS.

Water	10,018,138 bushels from 162 steamers and 11 barges.	
Rail	17,129,617 " from 11,850 cars.	
Total	27,147,755 "	
Canadian grain.....		20,871,274 bushels
American grain.....		6,276,481 "

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RECORD OF RECEIPTS AND DELIVERIES OF THE HARBOUR COMMISSIONERS' GRAIN ELEVATOR SYSTEM FOR 1923—*Concluded*

DELIVERIES

Conveyer.....	26,014,079 bushels
Cars.....	1,320,641 "
Teams.....	44,209 "
Bags.....	5,041 "
Total	27,383,970 "

SUMMARY OF GRAIN HANDLING ELEVATORS 1, 2, AND B, 1923

RECEIPTS

Water 74,631,578 bushels from 1,052 steamers and 95 barges.
Rail 45,476,412 " from 27,631 cars—16,649 C.N., 10,982 C.P.
Total 120,107,990 "

Canadian grain.....	86,403,459 bushels
American grain....	33,704,531 "

DELIVERIES

Conveyer.....	112,753,836 bushels
Cars.....	4,278,850 "
Teams.....	1,618,703 "
Bags.....	1,288,741 "
Total.....	119,940,130 "

Stock in Elevators at end of season.....	3,516,577 bushels
Transferred by floating elevators.....	20,000 "

HARBOUR RAILWAY TERMINALS

For the greater part of the season of navigation electric motive power was used on the terminals as a complement to the steam power, in the services on which electric locomotives were employed satisfactory results were obtained.

No new track work of importance was undertaken during the year.

A new eastern connection between the harbour tracks and those on Commissioners' street was laid down and found useful in facilitating switching operations.

An extensive re-arrangement of tracks consequent upon construction of Elevator No. 3 made for more difficult and expensive operations of traffic on that part of the terminals.

Total number of cars handled by the Commissioners during 1923 amounted to 216,382, as against 200,593 in 1922.

The total mileage of harbour railway tracks in 1923 was 60.64, as against 58.77 in 1922, or 320,200 lineal feet for 1923, as against 310,349 lineal feet in 1922, an increase of 9,851 lineal feet.

POLICE DEPARTMENT

During the summer season the harbour police force consisting of one chief, three captains, and forty-seven constables, regulated traffic on the wharves, maintained order, and protected life and property within the harbour limits.

During the winter season the force consisted of four officers, twenty constables, and one fireman.

During the season 121 passenger ships docked, carrying 31,285 passengers from European ports, and the same number sailed with 32,327 passengers. At the Canada Steamship Lines wharf, Victoria pier, passengers in lake and river

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steamers numbered 65,969, and the local passenger traffic from Victoria pier amounted to 27,856 passengers, making a grand total of 157,437 passengers arriving at and departing from the port during the season.

The harbour police saved nine persons from drowning during the season.

During the year 112 arrests were made on the wharves.

Carters to the number of 17,527 were checked and regulated by the traffic constables.

Taxicabs and cabs to the number of 18,857 were regulated coming and going during the season.

No accidents occurred during the season within the harbour limits.

SHIPPING—PORT OF MONTREAL

STATEMENT showing the Nationalities and Tonnage of sea-going vessels that arrived in port during season of 1923, which were navigated by 66,929 seamen

Nationality	No. of Vessels	Tonnage
British.....	836	2,979,660
Norwegian.....	77	178,716
American.....	57	131,157
Italian.....	30	100,105
Danish.....	27	50,266
Dutch.....	22	61,114
French.....	16	41,490
Danzig.....	14	72,368
Japanese.....	10	36,831
Greek.....	6	20,170
Swedish.....	6	11,797
Spanish.....	5	18,398
Jugo-Slavia.....	4	10,766
Belgian.....	2	6,234
German.....	2	4,238
Finnish.....	1	2,782
Latvian.....	1	1,448
Cuban.....	1	1,200
	1,117	3,728,740

TRADE OF THE PORT

Although Montreal is primarily a grain port, and as already pointed out there was a decline in the amount of grain exported as compared with the amount in 1922, its general trade is also very considerable, and there was a marked increase over 1922 in the incoming and outgoing tonnage of a number of commodities. Some of the chief commodity increases of 1923 over 1922 were:—

Agricultural implements.....	3,830 tons
Automobiles.....	22,307 "
Firebricks.....	6,164 "
Cheese.....	28,488 "
Dry goods.....	5,022 "
Flaxseed.....	17,884 "
Flour.....	17,551 "
Iron and steel bars.....	15,716 "
Lard.....	5,989 "
Liquors.....	5,439 "
Machinery.....	5,581 "
Meats, cured.....	4,863 "
Milk in tins.....	4,283 "
Oil in bulk.....	107,041 "
Sand.....	28,437 "
Steel billets.....	6,615 "
Live stock.....	7,775 head

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QUEBEC HARBOUR COMMISSION

CHIEF ENGINEER'S REPORT

Dredging.—Commissioners dredge No. 2 worked in the estuary of the St. Charles river from May 16 to Nov. 22, 1923, to provide a turning basin for vessels west of pier No. 1, to a minimum depth of 35 feet of low water. This basin has a diameter of 1,300 feet and will be completed next year. Total amount of material removed was 582,840 cubic yards.

Breakwater Facing.—The work of repairing the breakwater on the river side started in 1922, is now completed, and the entire length of 880 feet is now in good condition.

Grain Elevator Alterations.—Alterations tending to increased efficiency were made to the marine tower. Minor alterations were made to elevator No. 2. The telephone system in the grain galleries was completely overhauled.

Cattle Depot.—To accommodate the cattle trade the north end of shed No. 27 was divided into cattle pens, hay racks, water troughs, gangways, and a weighing scale were provided. There is present accommodation for 800 head, and the balance of the shed is available should the trade warrant its use.

Berth No. 28.—Improvements begun in 1922 have been completed. Minor improvements have been made to the electric lighting system, and a concrete driving platform 18 feet wide laid along the eastern face of the Concourse.

Cold Storage Warehouse.—A cold storage plant is being built at the corner of Dalhousie and St. James streets. The plant will consist of a warehouse, 106 feet by 127 feet, 5 stories high; a fish storage house 40 feet by 60 feet, 2 stories high, and a two-storey power plant 40 feet by 60 feet.

The warehouse is of reinforced concrete with brick exterior curtain walls, the floors are of reinforced concrete.

Contents of building are:—

	General storage	Cold storage
Ground floor (receiving rooms, offices and elevator)...	101,000 cu. ft.	21,000 cu. ft.
Second floor.....	57,000 "	57,000 "
Third floor.....	57,000 "	57,000 "
Fourth floor.....	57,000 "	57,000 "
Fifth floor.....	57,000 "	57,000 "
	<hr/> 329,000 "	<hr/> 249,000 "

The building will be fitted with air cleaning machine, and air ducts to each of the cool rooms; each of the cool rooms will have an electric humidifier, and electric heater to offset any undue drop in winter temperature. The building will have 2 electric elevators capable of lifting 2 tons each at speed of 85 feet a minute.

Fish House.—Is 200 feet east of the main warehouse, is placed on piles driven in to the rock and capped with 3 feet of concrete. The upper story and roof are carried on steel beams. The floors are of reinforced concrete.

Contents are:

Lower floor—Receiving and shipping room.....	10,620 cu. ft.
“ Cool room.....	9,360 "
Upper floor cool room.....	17,280 "
	<hr/> 37,260

The cool rooms will store approximately 850,000 pounds of fish.

An air cleaning and preparing machine similar to the one for the warehouse will be installed.

Power Plant.—Forty feet east of warehouse, will be built on piles driven into the dock, and capped with 3 feet of concrete. On the lower floor will be the store room, heating apparatus, etc. On the main floor will be the machinery for refrigeration. The walls and floors of the building will be of concrete. It is expected that the plant will be in operation by September 1, 1924.

Indian Cove—The work of rebuilding the wharf here is being continued, 250 feet of the wharf is completed and about the same amount remains to be done.

General Improvements—

Refacing embankment cribwork of the inner basin for a length of about 1,200 feet.

Renewing the planking of wharf at berth No. 20 and paving the area east of shed with concrete.

Renewing the facing of Pointe-a-Carcy wharf and paving surface at south end of shed No. 21.

Building six large fenders for St. Charles river berths.

Paving with concrete area south of police station on cross-wall.

Re-laying about 2,000 feet of Commissioners rails with 80-pound rails.

The Commissioners property and plant have been maintained in good working condition.

The Cross-Wall bridge was operated for the first time the past season on April 9, and for the last time on December 24.

The water was retained in the wet dock for the first time the past season on May 2, and for the last time on December 5.

HARBOUR MASTER'S REPORT

The season of navigation on the lower St. Lawrence opened on April 10, when the *Labrador* of the Clarke Steamship Company left for the north shore and intermediate points with passengers and cargo.

On April 17 the ss. *North Shore* was the first arrival from the lower St. Lawrence.

On May 5, ss. *Gaspesian* of the Clarke Steamship Company arrived from Montreal, the first arrival of the season from that port.

On May 6, the first transatlantic liner, the *Montrose* arrived from Liverpool.

On December 20, the coasting steamers went into winter quarters in the inner and outer Louise basins, but owing to exceptionally mild weather even on the 22nd of December, the river and gulf of St. Lawrence was entirely free from ice, from the Great Lakes to the sea.

WHARFINGER'S REPORT

PORT OF QUEBEC SUMMARY OF GROSS TONNAGE, AND NUMBER OF VESSELS ARRIVED DURING 1923

	Vessels	Tonnage
Coasting vessels inward from sea.....	145	168,991
Coasting vessels from Montreal and Great Lakes.....	122	192,589
Ocean steamers inward from sea.....	255	2,526,966
Ocean steamers outward for sea via Montreal and Quebec.....	98	879,668
Total.....	620	3,768,214

PORT OF QUEBEC (LEVIS) SUMMARY OF NET TONNAGE AND NUMBER OF VESSELS ARRIVED DURING 1923

Vessels—90 Tonnage—123,861

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The traffic in connection with the St. Charles river docks and wharves was:—

LOWER PORT STEAMERS

Inwards—87 vessels.....	23,440 tons reg.
2,527 tons general cargo.	
Outwards—88.....	23,038 “
7,685 tons general cargo.	

QUEBEC—MONTREAL

Inwards—56 vessels.....	14,651 tons reg.
18,391 tons general cargo	
260 “ hay	
Outwards—43 vessels.....	11,488 tons reg.
2,046 tons general cargo.	

The docks were occupied during the winter months by 138 vessels of various tonnages.

TRAFFIC MANAGER'S REPORT

Loaded cars received.....	5,501	
Loaded cars forwarded.....	9,491	
		14,992
Empty cars received.....	8,672	
Empty cars forwarded.....	4,568	
		13,240
Total number of cars handled.....		28,232
Loaded passenger, mail and baggage cars handled.....		2,796
Total number of coal cars handled.....		5,485

GRAIN ELEVATOR No. 2

Grain Received—

In store at end of season, 1922.....	281,035 bush.
Wheat.....	3,180,936 bush.
Corn.....	330,883 “
Oats.....	1,610,476 “
Rye.....	545,257 “
Barley.....	11,725 “
Barley.....	11,725 “
	5,679,277 bush.
Total.....	5,960,312 “

Grain Delivered—

By conveyors.....	3,733,937 bush.
By cars.....	242,004 “
By bags.....	1,642,738 “
	5,618,679 bush.
In store Dec. 31, 1923.....	341,633 “

From the total of grain delivered 1,884,742 bushels were local deliveries, of which amount 277,950 bushels were recleaned.

IMPORTS AND EXPORTS (OCEAN AND COASTING VESSELS)

	IMPORTS	
	1922	1923
General cargo.....	127,322 tons	127,958 tons
Coal.....	262,188 "	345,975 "
Fuel oil.....	38,623 "	41,651 "
Cattle.....	282 head	117 head

	EXPORTS	
	1922	1923
Grain (overseas).....	1,949,635 bush.	3,733,937 bush.
General cargo.....	42,699 tons	42,573 tons
Lumber and timber.....	23,535,034ft.B.M.	16,578,837 ft. B.M.
Cattle (No exports owing to embargo).....		5,046 head

REVENUE AND EXPENDITURE

The operating revenue in 1923 amounted to.....	\$ 407,116 31
The operating expenditure in 1923 amounted to.....	379,826 37
Leaving a surplus of revenue over expenditure for 1923 of.....	27,289 94

GENERAL

During the season arrangements were made whereby the ss. *Carmania* and the ss. *Caronia* of the Cunard line, 20,000 ton steamers, and possibly some other vessels of the fleet, will make Quebec their terminal port in future.

Arrangements were made for the shipment of cattle from Quebec after a visit to the port by western cattle shippers, and during last season 5,045 head of cattle were shipped from the port.

MEMORIAL TO ABRAHAM MARTIN

On May 12, 1923, the unveiling took place of a monument erected on the Louise docks by the Canadian Pacific Company to Abraham Martin, the first "King's Pilot" on the St. Lawrence river and also the first settler in Canada. This ceremony was attended by a large number of prominent men, including representatives of the clergy, Provincial Cabinet Ministers, representatives of the Canadian Pacific Company, and the Quebec Harbour commissioners.

The unveiling was made by Mr. F. L. Wanklyn, General Executive Assistant of the C.P.R.

The plains of Abraham, now the National Battlefields park, were named after Abraham Martin, who had his farm on this historic ground.

DISTINGUISHED VISITORS

On May 26, 1923, a party of about 50 members of the Dominion House of Commons, members of the Associated Press, Hon. J. E. Caron, Minister of Agriculture for the province of Quebec, His Worship Mayor Samson, Senators Jules Tessier and D. O. Lespérance, Mr. H. P. Kennedy, cattle exporter, Mr. Rice Jones, General Manager of the United Grain Growers, and Mr. J. L. Juhlin, Managing Director of the Edmonton stockyards, paid a visit of inspection to the harbour, and were entertained by the commissioners.

On September 12, 1923, His Royal Highness, the Prince of Wales, landed at Quebec on his way to Alberta, and sailed from Quebec on the *Empress of France* on October 13, 1923.

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On October 23, 1923, the members of the Royal Grain Commission visited Quebec, and received the views of the Québec Harbour Commissioners, relative to the transportation of the western grain crops, and shipping of grain from Canadian ports.

CONVENTION OF PORT AUTHORITIES

Brigadier-General T. L. Tremblay, Commissioner and Chief Engineer, and the Secretary-Treasurer attended the sittings of the twelfth annual convention of the American Association of Port Authorities, held in New Orleans, La., on December 10, 11, and 12, 1923.

Brigadier-General Tremblay had the honour of being elected one of the Vice-Presidents of the Association.

The next annual meeting of the Association will be held in Los Angeles, Cal., in the Fall of 1924.

NEW WESTMINSTER HARBOUR COMMISSION

The Commissioners report that in the near future, it is expected a share of the large volume of grain now flowing westward to Vancouver, will be diverted to this port, as its advantages have been demonstrated to Western Provinces and Old Country shippers.

In co-operation with the department of Public Works, plans have been taken up for the deepening and improving the main channel of the river, in order to cope with the steady increase of deep-sea shipping, using the port.

REVENUE ACCOUNT FOR THE YEAR ENDED DECEMBER 31, 1923

1923		RECEIPTS	
Jan. 1	Balance in Bank of Toronto.....	286 73	
Dec. 1	Rental of water lots under lease.....	1,497 86	
Dec. 31	Harbour Dues.....	1,180 15	
			2,964 74
		EXPENDITURES	
<i>General expense—</i>			
	Telegrams.....	4 28	
	Office supplies and printing.....	154 55	
	Postage and revenue stamps.....	13 50	
	Office rent.....	30 00	
	Alterations to office.....	16 02	
	Membership fees Pacific coast Port Authorities.....	20 00	
	Brass sign for office.....	10 95	
	Legal services (from Oct. 19, 1921 to July 19, 1923.....	255 77	
	Commission on outside collections of harbour dues.....	45 75	
	Travelling and other expenses of Commissioners.....	84 00	
	Secretary's salary.....	835 00	
			1,469 82
<i>Poplar island (Expense a/c)—</i>			
	Annual rental under lease from Department of Indian Affairs.....	271 00	
	Repairs and renewals.....	19 35	
	Fire protection fee.....	8 00	
	Traffic sign on bridge.....	5 00	
	Insurance premium.....	38 55	
	Sign advertising Industrial Sites.....	119 00	
			460 90
<i>Capital Account—</i>			
	Office furniture.....	109 25	
	Maps and plans.....	2 40	
	Principal sum under agreement N. W. Construction and Eng. Co.....	250 00	
			361 65
			2,292 37
Balance in Bank of Toronto, Dec. 31, 1923.....			672 37

VANCOUVER HARBOUR COMMISSION

PERSONNEL

The Harbour Commission at present consists of: Guy H. Kirkpatrick, Esq., President, and R. E. Beattie and S. L. Prenter, Commissioners.

The Chief officials of the corporation are: Secretary, W. D. Harvie; Chief Engineer, W. G. Swan, Comptroller, Charles Reid; Harbour Master, A. H. Reed; Chief Accountant, P. M. Ferris; Supt. of Signals and Police, C. O. Julian; Supt. of Piers and Traffic, F. J. Russell; Supt. of Elevators, Colin McLean.

PROGRESS OF PORT

The increase of grain shipments from the port in recent years is shown by the following figures:—

1921.....	1,251,017 bushels
1922.....	14,463,833 "
1923.....	24,663,071 "

About four-fifths of the 1923 shipments went to the United Kingdom, and the Continent, and the balance to the Orient.

Foreign coastwise exports of general cargo in 1923 show a 30 per cent increase over those for 1922, and the export of logs and lumber, an increase of 50 per cent.

Deep sea exports of general cargo in 1923 show an increase of 339,128 tons over those for 1922, or about 45 per cent, while logs and lumber show an increase of 144,218,720 feet B.M. or about 90 per cent; salt and smoked fish to the amount of 24,370 tons were shipped to China and Japan in 1923, an increase of 10,596 tons over the figures for 1922. In 1923, of lead and zinc 44,920 tons were exported chiefly to the United Kingdom, Japan and China.

The increase in the value of the total imports and exports of 1923, over that of 1922 was \$47,490,292.

During 1923, 845 deep sea ships entered the port as against 717 in 1922, and 19,608 vessels of all classes, 2,959 more than in 1922.

The total gross tonnage in 1923 was 13,436,989 tons, as against 12,214,329 tons in 1922, an increase of 1,222,660 tons.

On October 26, 1923, there were in port 33 deep sea ships all in commission, and as many as 47 deep sea ships have been in the harbour on the same day, whether actually in commission or being fitted to take grain.

BALLANTYNE PIER

Ballantyne pier the construction of which has been going on since 1921, was formally opened for business on the 8th of October, 1923, in the presence of the Hon. Ernest Lapointe, Minister of Marine and Fisheries, the Deputy Minister, Mr. Alexander Johnston, and a large and representative number of all classes of the Community.

The contractors for the work were the Northern Construction Co., Ltd., and J. W. Stewart. The designs and plans were prepared by Mr. A. D. Swan, Consulting Engineer, who also supervised the construction work.

The pier situated between the Great Northern pier and the Hastings saw mill, is 1,200 feet long and 341 feet wide, and has four two-storey reinforced concrete sheds, three being 500 feet by 110 feet, and the fourth 400 feet by 110 feet; the total floor shed area is 395,500 square feet.

Freight elevators and escalators are used for the movement of goods between the upper and lower storeys of the sheds.

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In addition to other minor equipment, such as tractors and trailers and electric capstans for hauling cars into place, the pier is provided with thirteen electrically-operated cranes, including six of the jib-boom type and seven straight line combination cranes specially designed to handle grain in the most expeditious manner, and equally efficient as cargo cranes when not in use for grain.

An attractive feature of this pier is the fact that being of fireproof construction throughout, and with a most up-to-date automatic water sprinkler system installed in all the sheds, insurance rates are reduced to a minimum.

In addition to the pier proper, a shore quay was constructed on the east side, the construction being similar to that of the pier, and the basin in front of this quay wall was dredged to a minimum of 35 feet at low tide.

GRAIN ELEVATORS

No. 1 Elevator.—This elevator has been thoroughly overhauled, and a reinforced concrete annex added to it, completed on November 19, 1923, which increases its storage capacity from 1,250,000 bushels to 2,100,000 bushels.

This annex providing additional storage of 850,000 bushels, with shipping house, and 3 shipping legs and auxiliary increased grain shipping capacity at Lapointe pier (old government wharf) by 33 per cent.

No. 2 Elevator.—This elevator to be completed in the late summer of 1924 by the Northern Construction Co., Ltd., adjoins Ballantyne pier it is of reinforced concrete, capacity 1,500,000 bushels, a three-leg receiving house, and a six-leg shipping house, with conveyor galleries at Ballantyne pier, and a car unloading shed. Has a maximum shipping capacity of 90,000 bushels per hour.

Splendid lighting and ventilating arrangements, and a dust collecting system functioning wherever grain is moved, which will reduce to a minimum danger from explosion. The completion of this unit will bring the total storage capacity of the Commissioners' elevator up to 3,250,000 bushels. Besides the Commissioners' elevator, an elevator with a capacity of 550,000 bushels is under construction, to be operated by the British Oriental Elevator Co., and another with a capacity of 2,250,000 bushels now under construction will be operated by the Vancouver Terminal Grain Co., Ltd.

For the 1924 crop season the port will have an elevator capacity of 6,000,000 bushels.

INCREASED BERTHING FOR GRAIN VESSELS

Plans have been prepared for the construction of a loading jetty, 950 feet in length, 300 feet east of Lapointe pier.

It will consist of 50 feet by 56 feet timber cribs, protected by a 24-inch concrete curtain wall, and on this foundation will be built a four-belt grain conveyor capable of diverting all four streams to either side of the jetty. This work will be completed in time to handle the 1924 crop.

Jetty No. 2 for which plans are completed, will be operated in conjunction with No. 2 elevator at Ballantyne pier, and will be situated between the Great Northern pier and the B.C. Sugar Refinery wharf. It will consist of concrete cylinder clusters to support the conveyor towers, and will be protected from damage by berthing vessels by a series of dolphins. It will provide two additional loading berths for bulk grain and will operate in a similar manner to No. 1 jetty.

In addition to these, a number of mooring buoys to be added to as required, are being provided by the Commissioners.

TERMINAL RAILWAY

The section for Ballantyne pier to Lapointe pier was completed in October, and running rights on the Great Northern Railway Co's. tracks from False creek to Burrard inlet, obtained.

A number of spurs have been built to serve industries on the main water front and on Granville island industrial area, and the commissioners now have approximately 12 miles of tracks under operation.

GRANVILLE ISLAND

The plank roads are being replaced by permanent pavements of which about 10,000 square yards have already been laid, and portions of the water system renewed.

MINOR WORKS

Range lights were established at the entrance to False creek after a detailed survey of the entrance waters.

All piers, transit sheds, roadways, trackage, floats, etc., were maintained in good order, and certain underwater repairs were made at Lapointe pier.

A number of plans, and estimates were made for future development schemes.

HARBOUR POLICE

This force consists of a Superintendent, two sergeants, and eleven constables; they police the water front, enforce the by-laws, and perform special duties in connection with Lapointe and Ballantyne piers, the grain elevators, and the terminal railway.

PROSPECT POINT SIGNAL STATION

This service has been of value to the shipping interests, keeping an accurate daily record of the movements of all commercial vessels.

During the period of records from March 1, 1923, when the station was in full working order, the average monthly number of vessels passing Prospect point was 2,028 inward, and 2,080 outward.

BYLAWS AND TARIFFS

A number of the Commissioners' by-laws were amended, and several new by-laws passed.

Tariffs were prepared governing wharfage, storage, and other rates at Commissioners' piers, grain elevator rates, and terminal railway rates. The Tariff of Cargo Rates was revised.

REVENUE AND EXPENDITURE FOR YEAR ENDED DECEMBER 31, 1923

Operating revenue.....	\$725,880 30
Operating expenditures.....	362,868 91
Surplus for year ended December 31, 1923.....	\$ 363,011 39

RECORD OF SHIPPING FOR YEAR ENDED DECEMBER 31, 1923.

COASTWISE		
No. of vessels (local coastwise trading in B.C. waters)	Total gross tonnage	Total net tonnage
18,336.....	8,815,095	5,538,261
No. of vessels (foreign coastwise trading to Pacific coast U.S.A. ports)		
699.....	803,489	508,336

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RECORD OF SHIPPING FOR YEAR ENDED DECEMBER 31, 1923—*Concluded*

OCEAN GOING		Total gross tonnage	Total net tonnage
No. of vessels			
845.....		4,493,986	2,804,883

TOTAL SHIPPING OF ALL CLASSES

No. of vessels	Total gross tonnage	Total net tonnage
19,608.....	13,436,989	8,427,282
Increase over 1922—		
2,959.....	1,222,660	792,289

PASSENGER TRAFFIC, YEAR ENDED DECEMBER 21, 1923

	Passengers Landed	Passengers Shipped
	421,147	431,739
Increase over 1922.....	55,955	55,269

BELLEVILLE HARBOUR COMMISSION

1923—

January 1—To balance in Bank.....	\$ 961 29
Harbour dues received 1923.....	4,205 30

 \$ 5,166 59

Disbursements—

Harbour Master's salary.....	\$ 900 00
Secretary Treasurer's salary.....	50 00
Hydro Electric.....	176 51
Painting warehouse roof.....	75 40
Howe & Co. Account.....	9 45
Wolke Hardware.....	58 99
Printing for tenders.....	12 60
Repairs on dock.....	6 83
Painting warehouse.....	275 00
Floors for dock.....	35 61
Repairing revetment wall.....	365 00
Treasurer, Province of Ontario.....	10 00
Secretary Treasurer.....	50 00
Balance in Bank.....	3,141 20

 \$ 5,166 59

PORT WARDENS' REPORTS FOR THE YEAR ENDED DECEMBER 31, 1923

Reports were received from 12 port wardens; 7 from Nova Scotia port wardens, 2 from Quebec port wardens, and 3 from British Columbia.

The total amount of fees collected at the port of Montreal amounted to \$16,258.22; at the port of Vancouver to \$13,104; at the port of Halifax to \$3,635; at the port of Quebec to \$2,111; and at the port of Sydney, C.B., to \$1,188.

PORT OF MONTREAL

April 29.—Government steamer *Lady Grey* arrived in port 5.40 p.m. reported channel clear between Montreal and Quebec. This was sixteen days later than last year.

May 2.—Navigation opened by the arrival of ss. *Gaspesia* from Quebec, having wintered there. This opening is fifteen days later than last year. This vessel cleared again on the 4th of May.

May 3.—SS. *Bolingbroke* was first arrival from overseas, which is nine days later than last year, this owing to ocean vessels encountering heavy field ice in lower gulf. The field ice being so packed that most of the first liner

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sailings to Montreal were diverted to Halifax with their passengers and mail. The majority of vessels arriving up to the 20th of May reporting slight ice damage.

May 7.—The first departure overseas was the ss. *Cairnvalona*, which left for Newcastle and Leith with general cargo. Three days later than last year.

December 2.—Last departure overseas with grain and general cargo from this port was the ss. *Canadian Ranger*. Same date as last year.

December 6.—Final departure. The ss. *Gaspesia* with cargo, via Quebec for lower ports. One day later than last year.

VESSELS REPORTED

At the Montreal office during the season, 798 overseas vessels reported, aggregate tonnage 3,096,237 tons. This was a decrease of 130 vessels and 285,212 tons as compared with last season.

For the lower ports 263 vessels cleared, aggregate tonnage 539,736 tons; an increase of 33 vessels and 69,098 tons as compared with last season.

EXPORTS AND IMPORTS

Shipments of minerals, cement, etc., from Montreal show a slight decrease to last year's shipments, viz: 8,500 tons, and imports of coal cargoes from the United Kingdom showed a marked decrease.

CASUALTIES BETWEEN MONTREAL AND QUEBEC

June 1.—SS. *Mapledawn* collided with and sank coal barge *Brookfield* in harbour. Slight damage to *Mapledawn*.

June 2.—SS. *Mapledawn* grounded at cape St. Michael, refloated and proceeded to Quebec.

June 2.—SS. *Canadian Explorer* grounded Vercheres channel, after lightering part cargo, refloated and returned to Montreal, surveyed, no apparent damage, reloaded and proceeded on voyage.

June 7.—SS. *Krosfond* of Stavanger, reporting having touched bottom or submerged obstruction in vicinity of Contrecoeur channel. Vessel surveyed, no apparent damage.

July 8.—SS. *Lingfield* fouled mooring in vicinity Richelieu rapids, propeller damage, returned to Montreal, discharged part cargo, and dry-docked for repairs.

July 12.—SS. *Hartfield* touched bottom near Canada Cement wharf, surveyed, damage to bottom, but vessel making no water, proceeded to load.

August 3.—SS. *Cairntorr* grounded on West end, Plum island, Vercheres. Lightered part cargo, refloated and returned to Montreal, surveyed, vessel making no water, reloaded and proceeded on voyage.

August 5.—SS. *Turret Cape* aground north side of channel 11 miles below Montréal, refloated, no damage, proceeded.

October 16.—SS. *Lchigh* grounded in Cap. La Roche, refloated, no serious damage.

November 12.—SS. *General Milne* grounded at Cape Charles, refloated and proceeded to Quebec for survey and repairs.

November 25.—SS. *Kamouraska* grounded 14 miles below Montreal, refloated, no serious damage.

Low water in ship channel from middle of season till close of navigation, between Montreal and Quebec, necessitated curtailment of draft of a number of the deep draft vessels, the lowest depth in channel being, on October 21 and 22, twenty-seven feet, eleven inches.

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REPORT OF PACIFIC SALVAGE COMPANY, LIMITED, VICTORIA, B.C.

SALVAGE OPERATIONS FOR THE YEAR ENDING MARCH 31, 1924

April 27, 1923.—SS. *Brush* ashore point Arago, Coos bay, Oregon coast. Recalled as ship breaking up.

May 9 to May 11, 1923.—SS. *Lake Gebhart* ashore Johnson reef, seven miles south Umatilla reef. No operations as ship breaking up.

May 12 to May 13, 1923.—SS. *Matsqui* ashore at D'Arcy island, B.C.

May 16 to July 15, 1923.—SS. *Tuscan Prince* resumed operations salving cargo. Ship on Austin island, entrance Barclay sound, B.C.

July 28 to August 7, 1923.—SS. *Rainier* in collision in straits of Juan de Fuca.

July 29 to August 13, 1923.—SS. *Siberian Prince* ashore on Bentinck island, B.C.

August 31, 1923.—Ship reported in distress off Clo-Oose, B.C. Salvage ship recalled as report erroneous.

October 10 to October 21, 1923.—M.S. *Kennecott* ashore Hunter point, Graham island, B.C. Took off captain and remaining crew. Ship breaking up. No operations.

October 11 to October 12, 1923.—Tug *Czar* ashore Margaret bay, B.C.

October 13 to October 21, 1923.—SS. *Algerine* ashore on Brodie rock. Principle channel, B.C.

December 13, 1923.—Sailing vessel *Vancouver* in tow of tug reported in distress in heavy gale off Race rocks. Dispatched salvage vessel but ship not in need of assistance.

December 13, 1923.—Gasoline launch reported in distress in heavy gale off Pender bay. Responded to call but could not locate launch.

December 27, 1923.—Searched for tug *Tyee* sunk at Pedder bay.

January 14 to January 26, 1924.—C.N.R. barge ashore Watson rock, B.C.

February 8 to February 25, 1924.—SS. *Amur* ashore Whitecliffe island, B.C.

February 27 to March 2, 1924.—SS. *Tatjana* ashore Village island, B.C.

March 25 to March 26, 1924.—SS. *Tatjana* ashore Village island, B.C.

REPORT OF SALVAGE SERVICES RENDERED BY THE QUEBEC SALVAGE & WRECKING COMPANY, LIMITED, FROM MARCH 31, 1923, TO MARCH 31, 1924

1923

May 17 to June 4.—Danish steamer *Jan* struck off South point, Prince Edward island. We went to her assistance, refloated her, made temporary repairs to bottom, convoyed her to Montreal where she discharged her cargo and stood by her until June 4 when she was placed in dry dock at Lauzon.

May 25 to June 14.—Canadian Pacific Steamships steamer *Marvale* struck and sunk off cape Pine, Nfld. We went to her assistance in order to secure mail, baggage and valuables. Owing to the conditions and exposed position in which the steamer was sunk, only part of baggage, mail and three safes could be secured in spite of daring work by the divers. Every possible effort was made.

June 3 to 21.—Canadian steamer *Glenburnie* this steamer struck off cape St. George, Nfld., was assisted to St. George harbour to where we sent men and compressors, by use of same, the steamer was able to proceed to Montreal to discharge her cargo and later to dry dock at Lauzon.

Sept. 24.—Canada Steamship Lines steamer *Richelieu* went ashore off Deschambault, Richelieu rapids, went to her assistance but the steamer refloated herself before our arrival.

Oct. 7 to 10.—SS. *Lord Strathcona* towed dredge and four scows from Matane to Quebec.

Oct. 11 to 18.—Danzig tank steamer *Gedania* 14,000 tons stranded off point Tupper, Gut of Canso, went to her assistance, refloated her and conveyed her to Quebec.

Oct. 25.—SS. *Labrador*, Clarke Steamship Co., Ltd., at Seven islands. Her propeller being out of commission due to full length of wire being caught and turned around same, we sent diver with submarine wire rope cutting machine and cleared the propeller which enabled the steamer to proceed on her north shore trip eastward.

The SS. *Lord Strathcona*, schooner *G.T.D.* properly manned with all salvage gear, in good order, has been kept in commission during the season of navigation to proceed to any accidents or mishaps to ships at very short notice.

RETURNS OF SHIPPING MASTERS FOR THE YEAR ENDING
DECEMBER 31, 1923

NOTE.—The Collector of Customs acts as shipping master where no shipping master is appointed.

QUEBEC

Name of Ports	Name of County	Name of Shipping Master	Seamen shipped	Seamen discharged	Amount
Chandler.....	Gaspe.....				
Escoumains.....	Saguenay.....	J. B. S. Copping.....	Nil	Nil	Nil
Gaspe.....	Gaspe.....	F. G. Eden.....	17	10	11 50 \$ cts.
Grand Pabos.....	Gaspe.....				
Montreal.....	Hochelaga.....	I. O. Grey.....	10,126	12,071	4,273 90
Magdalen Islands.....	Gaspe.....	C. F. Painchaud.....	Nil	Nil	Nil
Paspebiac.....	Bonaventure.....	E. W. LeGallais.....	Nil	2	0 60
Perce.....	Gaspe.....	Phil. LaBoutellier..	Nil	Nil	Nil
Quebec.....	Quebec.....	T. Beland.....	1,141	100	697 80
Rimouski.....	Rimouski.....				
St. John.....	St. John.....				
Three Rivers.....	St. Maurice.....	W. D. Fisher.....	310	151	184 90
			11,594	12,334	5,168 70

NEW BRUNSWICK

Albert.....	Albert.....	H. W. Crocker.....	Nil	Nil	Nil
Alma.....	Albert.....	H. O. Joyce.....			
Bain Veau.....	Westmorland.....				
Bathurst.....	Gloucester.....	C. J. Melanson.....	Nil	Nil	Nil
Chatham.....	Northumberland.....	R. J. Walls.....	22	16	15 80
Dalhousie.....	Restigouche.....	John B. Delaney....	6	1	3 30
Dorchester.....	Westmorland.....				
Fredericton.....	York.....				
Grand Harbour.....	Charlotte.....				
Harvey.....	Albert.....				
Hillsborough.....	Albert.....				
Lepreau.....	Charlotte.....	J. E. Haggerty.....	Nil	Nil	Nil
Musquash.....	St. John.....				
New Brunswick.....	Gloucester.....				
Newcastle.....	Northumberland.....	John Russell.....	5	17	11 00
Riverside.....	Albert.....				
Rockport.....	Westmorland.....				
Sackville.....	Westmorland.....				
St. Andrews.....	Charlotte.....				
St. George.....	Charlotte.....	J. A. Skinner.....	7	6	5 30
St. John.....	St. John.....	W. H. Purdy.....	2,577	1,774	1,297 66
St. Martins (or Quaco)	St. John.....	R. Allan Love.....	17	6	10 30
St. Stephen.....	Charlotte.....				
Shediac.....	Westmorland.....				
Shippigan.....	Gloucester.....				
			2,634	1,820	1,343 36

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RETURN OF SHIPPING MASTERS—Continued

NOVA SCOTIA

Name of Port	Name of County	Name of Shipping Master	Seamen Shipped	Seamen discharged	Amount
					\$ cts.
Advocate Harbour....	Cumberland.....	E. C. Moroe.....	1	Nil	0 50
Amherst.....	Cumberland.....				
Annapolis Royal.....	Annapolis.....				
Antigonish.....	Antigonish.....				
Apple River.....	Cumberland.....				
Arichat.....	Richmond.....				
Baddeck.....	Victoria.....				
Barrington.....	Shelburne.....	W. W. Gray.....	Nil	Nil	Nil
Barton.....	Digby.....				
Bayfield.....	Antigonish.....				
Belliveau Cove.....	Digby.....				
Bear River.....	Digby.....	J. L. Warren.....	Nil	Nil	Nil
Bridgewater.....	Lunenburg.....	C. N. Corkum.....	81	49	55 20
Canning.....	Kings.....	J. W. Miller.....	2	Nil	1 00
Canso.....	Guysborough.....	J. Rutherford.....	40	24	27 20
Church Point.....	Digby.....				
Clark Harbour.....	Shelburne.....				
Clementsport.....	Annapolis.....	H. L. Vroom.....	11	9	7 70
Cheverie.....	Hants.....				
Descousse.....	Richmond.....				
Digby.....	Digby.....	A. E. Cousin.....	50	28	33 40
Five Islands.....	Colchester.....	H. E. Fulmer.....	10	6	6 80
Glace Bay.....	Cape Breton.....				
Great Village.....	Colchester.....				
Guysborough.....	Guysborough.....				
Hawkesbury.....	Inverness.....				
Halifax.....	Halifax.....	H. S. Drake.....	4,490	4,321	1,741 33
Hastings.....	Inverness.....				
Hantsport.....	Hants.....	W. D. Comstock....	13	13	10 40
Havre Bouche.....	Antigonish.....				
Isaac Harbour.....	Guysborough.....				
Jordan Bay.....	Shelburne.....				
Lahave.....	Lunenburg.....	Wm. Maschke.....	153	139	125 85
Liscomb.....	Guysborough.....	Wm. Hemlow.....	15	10	10 50
Liverpool.....	Queens.....	W. A. Smith.....	110	61	73 30
Lockeport.....	Shelburne.....	J. R. Ruggles.....	7	4	4 70
Louisburg.....	Cape Breton.....	W. W. Lewis.....	230	140	157 00
†Lunenburg.....	Lunenburg.....	B. C. Knock.....	641	177	484 90
*Mahone Bay.....	Lunenburg.....	T. F. Mader.....	25	5	19 00
Mainadieu.....	Cape Breton.....				
Maitland.....	Hants.....				
Margaretsville.....	Annapolis.....				
Margaree.....	Inverness.....				
Merigomish.....	Pictou.....				
Meteghan.....	Digby.....	L. T. Melanson.....	73	52	52 10
New Campbellton.....	Victoria.....				
North East Harbour.....	Shelburne.....	G. B. Swaine.....	Nil	Nil	Nil
North Sydney.....	Cape Breton.....	M. J. Ross.....	603	541	463 80
Parrsboro.....	Cumberland.....	J. S. Henderson.....	193	102	127 10
Pictou.....	Pictou.....	W. E. Jones.....	69	36	45 30
Port Greville.....	Cumberland.....	B. L. Hatfield.....	69	52	50 10
Port Hawkesbury.....	Inverness.....				
Port Hastings.....	Inverness.....	Geo. L. McLean....	6	Nil	3 00
Port Hood.....	Inverness.....				
Port Latour.....	Shelburne.....				
Port Lorne.....	Inverness.....				
Port Medway.....	Queens.....				
Port Morien.....	Cape Breton.....				
Port Mulgrave.....	Guysborough.....	M. J. Keating.....	9	12	8 10
Port Wade.....	Annapolis.....				
Port Williams.....	Kings.....				
Pubnico.....	Yarmouth.....				
Pugwash.....	Cumberland.....				
River Hebert.....	Cumberland.....				
Riverport.....	Lunenburg.....	E. Wentzell.....	33	24	23 70
St. Anns.....	Victoria.....	D. M. MacAskill....	Nil	Nil	Nil
St. Peters.....	Richmond.....				
Salmon River.....	Digby.....	F. P. Deveau.....	7	10	6 50
Sandy Point.....	Shelburne.....	A. S. Goodick (Act.)	16	9	10 70

RETURN OF SHIPPING MASTERS—Continued
NOVA SCOTIA—Concluded

Name of Port	Name of County	Name of Shipping Master	Seamen Shipped	Seamen discharged	Amount
					\$ cts.
Sheet Harbour.....	Halifax.....				
Shelburne.....	Shelburne.....	A. C. Bruce.....	32	21	22 30
Sherbrooke.....	Guysborough.....				
Spencers Island.....	Cumberland.....	Geo. D. Spicer.....	6	Nil	3 00
Sydney.....	Cape Breton.....	V. Mullins (Act.)....	358	257	246 24
Thorne Cove.....	Annapolis.....				
Truro.....	Colchester.....				
Tatamagouche.....	Colchester.....	J. Rasway.....	Nil	Nil	Nil
Wallace.....	Cumberland.....	A. D. Macfarlane....	Nil	Nil	Nil
Walton.....	Hants.....				
West Arichat.....	Richmond.....				
Weymouth.....	Digby.....				
Windsor.....	Hants.....				
Wolfville.....	Kings.....				
Yarmouth.....	Yarmouth.....	Geo. L. Wetmore....	384	418	332 40
			7,737	6,520	4,153 12

PRINCE EDWARD ISLAND

Alberton.....	Prince.....				
Charlottetown.....	Queens.....	F. Beers.....	46	40	35 00
Crapaud.....	Queens.....	Neil Waddell.....	7	2	2 80
Georgetown.....	Kings.....	T. E. Morrissee.....	Nil	Nil	Nil
Malpeque.....	Prince.....	R. J. Crafer.....			
Murray Harbour.....	Kings.....				
Montague.....	Kings.....				
Pinette.....	Queens.....				
Port Hill.....	Prince.....				
St. Peters.....	Kings.....				
Souris.....	Kings.....				
Summerside.....	Prince.....				
Tignish.....	Prince.....				
			53	42	37 80

BRITISH COLUMBIA

Aboucet.....	Vancouver.....				
Clayoquot.....	Comox-Atlin.....	John Gruce.....	Nil	Nil	Nil
Hesquiat.....	Comox-Atlin.....	Chas. Moser.....	Nil	Nil	Nil
Kyoquot.....	Comox-Atlin.....				
Masset.....	Comox-Atlin.....	James Martin.....	2	4	
New Westminster....	New Westminster....				
Prince Rupert.....	Atlin.....	E. McCoskrie.....	573	573	458 40
Tofino.....	Comox-Atlin.....				
Vancouver.....	New Westminster....	J. B. Campbell.....	6,907	7,251	3,816 00
Victoria.....	Victoria.....	Geo. Kirkendale....	1,907	1,621	1,439 80
			9,389	9,479	5,714 20

†38 vessels, \$3 per vessel. *Shipped two Fishing crews at \$2.50.

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RETURN OF SHIPPING MASTERS—*Concluded*

RECAPITULATION

Province	Seamen Shipped	Seamen discharged	Amount
			\$ cts.
Quebec.....	11,594	12,334	5,168 70
New Brunswick.....	2,634	1,820	1,343 36
Nova Scotia.....	7,737	6,520	4,153 12
Prince Edward Island.....	53	42	37 80
British Columbia.....	9,389	9,479	5,714 20
	31,407	30,195	16,417 18

LIVE STOCK SHIPMENTS

LIST of live stock shipped to ports in Great Britain, Belgium and South Africa
during the year 1923

QUEBEC

Months	Sheep	Horses	Cattle
July.....		1	389
August.....			1,844
September.....			200
October.....			592
		1	3,025

ST. JOHN

January.....			674
February.....			350
March.....	201		1,594
April.....			1,788
May.....			621
June.....			700
August.....			1,213
December.....		1	585
	201	1	7,525

MONTREAL

May.....	95		5,193
June.....	50		6,464
July.....			3,641
August.....			3,057
September.....			2,500
October.....			3,865
November.....		2	5,096
	145	2	29,816

HYDROGRAPHIC SURVEY

REPORT OF W. J. STEWART, M.E.I.C., CHIEF HYDROGRAPHER

The work of the Survey is carried out by the following branches:—

The Atlantic Coast Survey under Capt. F. Anderson using the steamer *Acadia*.

The Lower St. Lawrence Survey under Mr. Charles Savary, using the steamer *Cartier*.

The Magdalen Islands Survey under Mr. G. A. Bachand using the steamer *Bayfield*.

The Pacific Coast Survey under Mr. H. D. Parizeau, using the steamer *Lillooet* and the tug *Restless*.

Supervision of Automatic Gauges between Quebec and Port Arthur, under Mr. Charles A. Price.

Chart Preparation, Engraving and Printing, in charge of Mr. G. L. Crichton.

The cost of these surveys and divisions was, during the season:—

Atlantic Coast..	\$ 65,823.93
Lower St. Lawrence..	78,359 07
Magdalen Islands..	36,993 70
Pacific Coast..	108,966 32
Automatic Gauges..	18,163 52
Headquarters, miscellaneous..	43,172 69
	<hr/>
	\$351,479 23

The steamer *Acadia* was fitted out at Halifax and after some delay was commissioned on the 12th of June.

An examination was made at the beginning of the season of a new danger on which the ss. *Belvernon* was reported to have struck in the entrance to Shelburne harbour. This proved a mistake, the vessel having grounded in the entrance to Negro harbour on a well-known charted rock.

The season was spent in extending the off-shore sounding at the entrance to the bay of Fundy, but the progress made was slow on account of frequent fogs. The party, however, succeeded in obtaining 2,000 miles of linear soundings covering an area of about 2,000 square miles and accurately defining the 50-fathom and 100-fathom contour lines, which will greatly assist vessels entering the bay in foggy weather.

In the vicinity of Briar island the following new features have been defined: 17 fathoms least water over rock bottom and of small extent known locally as the Young Lurcher was located, bearing southwest, distant 6 miles from southwest ledge and joined thereto by less than 30 fathoms of water. From northwest ledge the bank under 30 fathoms was found to extend in a west by south direction for 12 miles having a spot with 16 fathoms two-thirds of the distance and 22 fathoms near the southerly extreme of the bank. From the above ledge the 50-fathom bank extends 25 miles in a general west southwest direction for the outer nine miles of which the bank is quite narrow.

In the neighbourhood of Grand Manan island the bank of the same name was found in much the same position and extent under 50 fathoms as shown on the existing chart, however, 16 fathoms least water was found instead of 24 fathoms.

The two detached spots shown south of the above bank apparently consist of one bank under 50 fathoms extending six miles north and south by half that distance across with a least depth of 28 fathoms about the middle and about three miles to the westward of that shown on the Admiralty chart.

CURRENTS

The currents in the entrance to the bay were found very irregular probably due to the many banks and a great menace to navigation especially during the prevailing fog. Making allowance for stage of tide did not always work out very well and great caution had to be exercised.

Local magnetic disturbance of more or less intensity was found to the southward of Grand Manan island about the islands and reefs but was not apparent outside or to the south of them, also some disturbance was noted in Yarmouth harbour. About one mile south from Three islands the compass indicated from 13° E. to 54° W. within a small area. About Bull rock 5° W. declination was noticed, also three miles northwest by north from Gannet rock 10° W., in fact the whole area inside the outer reef was found affected. The *Acadia* frequently entered Seal cove during fog, but great caution was exercised for the above reason and changeable currents.

MAGNETIC DECLINATION

In Yarmouth harbour the following disturbance was found: 3° W. at cape Fourchu, 2° E. at Johns cove, 4° W. at ship's stern, 6° E. at Fish point, zero at Elder head, all of which refer to the land. Entering the harbour on the *Acadia* after passing Hen and Chickens 3° westerly deviation was noted, which was apparently lost abreast ship's stern for a short space when the compass was noticed to swing 3° or 4° to the eastward. From Bug lighthouse to Battery point 4° W. from thence to the turn in the channel 5° W., thence heading on the NW. corner Baker's wharf 3° E. was noted, and 3° W. off the town wharves.

TRIANGULATION

The side Grand Manan station on the north end of Grand Manan island and Little river station on Digby neck, of the Canadian Geodetic Survey, a distance of about 35 miles, being taken as a base, the triangulation was extended to the southward and eastward of Gull island lighthouse, off Lockeport, including cape Sable, a total distance of 140 miles. For the above it was necessary to build sixteen main stations and observe thirty-five, including lighthouses. Owing to the comparatively long sights necessary much delay was caused by the usual prevailing weather in July and August in the bay of Fundy.

The land being comparatively low and wooded without any prominent hills offering between cape St. Mary and Yarmouth three ship stations were resorted to, giving good results. The distances carried down the shore to the side of Green island to Markland, a distance of seven miles off the Yarmouth harbour base, checked up to within three feet. From Yarmouth onward shore points were available. Rounding cape Sable to the northwest wireless station tower at Barrington was used, deducing all angles to facilitate operations. The weather being such as did not admit of delay in building stations, however, the distance when checked up on the $6\frac{1}{2}$ -mile side Baccaro light to Negro light agreed almost exactly with that obtained from a measured base in the entrance to Negro harbour.

WEATHER

During the past summer the weather conditions on the whole, though moderate, were quite unsuitable for surveying and not until the month of November was any period of fine clear atmosphere experienced.

July and August, the months of most frequent fog, were fairly free from that drawback; however, for the most part hazy weather prevailed, making low visibility.

September and October, when one would expect it fairly clear, fog and rain were the order of the day and for 75 per cent of the time. Not until the month of November was any period of fine weather available which enabled the completion of the sounding and triangulation.

RADIO

For experimental purposes a radio compass was installed on the *Acadia* about the end of June. The aerial consisted of two wire triangles installed on the after part of the ship; one triangle in the fore and aft line and the other athwartship, the apices being interlocked and insulated and aerial connected with an instrument in the wireless room. After being adjusted, the set was calibrated at every opportunity, the results of which showed that bearings taken carefully in moderate weather when fair compass bearings could be obtained, compared very favourably with those from the shore Direction Finding station or within an error of 2 degrees. However, the results were not such as would recommend it for survey purposes. Still in the district in which the *Acadia* was operating wireless stations were not located conveniently enough to give the apparatus a fair trial, being too far distant. Even the Lurcher lightship was laid up for repairs when it might have been most useful.

The aerial of the Direction Finding station being erected at the entrance to Yarmouth harbour was staked out and calibrated, the site just south of Kelly cove being found fairly satisfactory for that purpose.

After closing the survey for the season a trip was made to St. Paul island, Cabot strait, and the Direction Finding station located there calibrated on Thursday, November 22. Although the weather proved poor, due to fog and haze, still the above was carried out satisfactorily. Owing to the lateness of the season it was not considered advisable to await a more favourable opportunity. The *Acadia* arrived at Halifax on Monday evening, November 26, having been delayed by boiler trouble and heavy weather.

On the following morning in accordance with instructions the laying up of the ship was proceeded with and the Survey staff returned to Ottawa.

During the past season the Survey staff consisted of the following: Mr. J. U. Beauchemin, Assistant Hydrographer, and Mr. R. W. Bent, Junior Hydrographer, both of whom deserve credit for their close attention to duty and general efficiency, and W. A. Thorne, Instrument Man, who left on September 15 to continue his college course, being replaced on the same day by another instrument man, Mr. H. P. Williams, who after finishing the season has been transferred to the Automatic Gauge staff of this branch of the Marine Department.

The result of the season's operations is a much needed chart of the entrance to the bay of Fundy on a scale of $2\frac{1}{2}$ miles to one inch, including cape Sable and Yarmouth radio station, the latter being a Direction Finding station. The chart will extend to the northward past the entrance well into the bay of Fundy including the southwest point of Grand Manan island to the westward.

LOWER ST. LAWRENCE SURVEY

After some delay in fitting-out this steamer, the C.G.S. *Cartier*, commissioned on May 21, and with sweeping apparatus borrowed from the St. Lawrence ship channel proceeded to the Saguenay to examine the dredged channel between St. Fulgence and Chicoutimi. The survey developed that the channel whilst generally clear at 16 feet L.W.O.S., had numerous spots with only 11 feet or 12 feet over them.

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This work was completed on June 7, and the steamer returned to Quebec with the scow, but later on developed trouble with the starboard tail-shaft, compelling a return to Quebec and the party again set out for their season's work on June 17.

Between June 19, and August 5, the work was carried on off-shore between cap Rosier and point Peter and from the southwest point to west point of Anticosti island.

Between August 6 and 18, an investigation was made of the lower part of Bersimis river between the mouth and a point six miles up, for the benefit of a new industry being established there.

Between August 20 and October 27, work was resumed off the Gaspé coast.

Stations were occupied for triangulation and sounding along fifty miles of the coast, 13,000 linear miles of sounding were done from the ship, 460 linear miles from the boats and 30 linear miles of coast-lining accomplished.

As a result of the last two seasons' work the new chart of the area between southwest point of Anticosti island and cap Madalene has been placed in the hands of the engravers and a general chart on a much smaller scale has been drafted to cover the area between the west point of Anticosti and Bic islands.

The staff of this survey was greatly reduced during the season owing to the illness of Messrs. Ghysens and Foreman; Junior Hydrographers Bowes and MacKinnon continued as assistants.

The *Cartier* returned to Quebec at the end of October and was placed in dry-dock for renewal of her decks.

MAGDALEN ISLANDS

After many delays in outfitting at Halifax the steamer *Bayfield* was commissioned on July 18, for work at the Magdalen islands. She arrived at her station on July 21, and continued there until October 7, when the weather proved too stormy to further risk the safety of this small vessel. As is well known these islands afford very poor shelter to vessels compelled to operate in their neighbourhood: the anchorages are very small and very shallow: it is usually necessary to cross the bars before the sea makes, and when inside, the shelter from the wind is of the poorest. Two exceptionally heavy storms were experienced and it is only by the greatest of good fortune that very serious accidents were averted.

During the summer stations were built over 60 miles of coast, 100 linear miles of sounding from the ship were obtained and 400 miles of boat sounding, together with 50 linear miles of coast-lining accomplished.

The party left the Magdalen islands on October 7, and proceeded to the Restigouche river to examine and re-mark the channel between Dalhousie and Campbellton.

During the five and one-half weeks over which operations were carried on here, 17 miles of river were triangulated, 60 nautical miles were sounded in an area of eight square miles and five miles of coast-lining done.

The *Bayfield* left the Restigouche on November 14, and laid up at Charlottetown for the winter.

As a result of the season's work a sheet of the Magdalen islands is under way and information has to be obtained that will permit of a proper marking of the Restigouche between Dalhousie and Campbellton.

The staff of this survey consisted of Mr. Bachand in charge, assisted by Messrs. Wilson and Smith.

PACIFIC COAST SURVEY

As usual for work on this coast the steamer *Lillooet* with the small tug *Restless* were placed in commission and the houseboat *Somass* was used instead of placing a party in camp, this being found more efficient and comfortable.

Mr. Parizeau took command of the *Lillooet* and had for assistants on the boat Messrs. Parker and Willis. Commander Knight took charge of the *Restless* and had for assistant Mr. L. R. Davies. The party was augmented by the despatch of Mr. H. L. Leadman from the east coast to take charge of the *Somass* with Mr. J. B. T. Lewis as his assistant.

After various unnecessary delays the *Lillooet* got under way on April 11, the *Restless* on April 17, and the *Somass* on April 21.

The first work undertaken was the completion of the surveys of the entrances to Victoria and Esquimalt by sounding out the bay between Race rocks and Seabird point. This work occupied most of the party until June 5, but during that period the *Lillooet* was despatched to Vancouver to assist the Department of Public Works in the sweeping of First narrows and later to examine some reported rocks in Esperanza inlet.

She succeeded in finding these and reports have been made concerning them.

On June 6, the whole party left Victoria for Genoa bay and made a survey of that water.

On June 9, after calling at Ladysmith the party moved to Okisollo channel and Surge narrows and completed a survey of that water by July 11. This new survey should prove of great value to vessels trading up and down the coast as it is perfectly feasible for navigation purposes.

The *Lillooet* reached Borrowman bay on July 16, and resumed the survey of the approaches to Caamano sound being assisted by the party on the *Somass*. Operations were carried on in this neighbourhood until October 1.

During the season, in addition to the main work at Caamano sound surveys were made of various portions of the Queen Charlotte islands in the neighbourhood of Skidegate, of Atli inlet and approaches and Surf inlet: a beginning was made for the resurvey of Porlier pass for the information of the Department of Public Works.

Commander Knight with the *Restless* completed the survey for the chart "Idol point to Ocean falls" and as a result of the season's work many improvements will be made in the charts of the British Columbia coast. These are principally surveys of small places of growing importance which cannot be used until properly surveyed.

The party reached Victoria on November 15, and the vessel was laid up. The officers took up their usual quarters in the British Columbia Permanent Loan building and immediately took up the work of preparing sheets for the engraver.

The work of the Hydrographic Survey in British Columbia is particularly important; most of the old charts are very much out of date and new rocks are from time to time being reported. Calls are frequently made on the survey for examinations and much time is lost in running about to get this information. It is hard to see how such a condition can be avoided unless more funds are put at our disposal and the staff increased, with additional steamers.

ST. LAWRENCE RIVER

During the season and owing to the unusually low water in the St. Lawrence river between Sorel and lake Ontario, various complaints were received from vessels touching bottom, and Mr. Fraser from the head office was sent to investigate all of these. The first one was at St. Helen island, Montreal

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harbour, where the ferry boat had difficulty making the wharf. A careful resurvey was made of the approach and this resulted in a new channel being developed and the ferry was able to make her landing without mishap and without necessitating expensive dredging.

In the upper St. Lawrence various groundings took place in the river between Morrisburg and the head of the Cornwall canal; dangerous spots were found outside the limits of the banks marked on the American charts, which are the only ones in existence in that section of the river. These spots were carefully examined and buoyed, so that no complaints were afterwards received.

Occasion was taken of Mr. Fraser's presence in that portion of the river to locate various features in such a manner as to enable their being plotted on the charts.

Unless the larger development of the river is proceeded with in the near future it is in the opinion of the undersigned highly desirable that a new survey of this part of the river be made without loss of time. The only charts of that portion of the river are from American sources. They were made by the Lake Survey many years ago when the appliances for proper hydrographic work were not as fully developed as they are to-day. The channels are all on the Canadian side of the boundary line and nine-tenths of the traffic is Canadian, in Canadian waters.

AUTOMATIC GAUGES

During the year twenty-six automatic gauges were in operation on the Great Lakes and St. Lawrence river between Quebec and Port Arthur. With the exception of those in the St. Lawrence river in places where high water in the spring overtops the docks these gauges are all in working order during the twelve months of the year and are giving very valuable records.

Early in the season the Department of Justice asked to have some observations taken in Hamilton inlet and lake Melville with a view to ascertaining whether or not mean sea-level in the latter place was higher than in the former. For this purpose Mr. Charles Price was sent up to install two automatic gauges and Mr. J. R. Dupuis of the office staff was sent with him as assistant. The gauges were established and records obtained during two complete lunar months with very satisfactory results.

During the year Mr. Price's staff has suffered through the death of Mr. A. R. Lee, who had been connected with the Survey for over ten years, and illness was responsible for Mr. Hannington's absence from the office for three months. Mr. Price had, however, valuable assistance from Mr. Miller both in the field and in the office, and from Mr. Matthewman and Mr. Williams on office work, while Mr. Dupuis was with him at Hamilton inlet.

During Mr. Price's temporary absence in the latter place, Mr. Miller acted as officer in charge in a very efficient manner.

Attached are tables, giving:—

1. Monthly mean water surface elevations of the Great lakes during 1923.
2. Monthly mean water surface elevations of the St. Lawrence river during 1923.

The work of the draughting room has been carried out under Mr. G. L. Crichton, with Messrs. F. Delaute, A. J. Pinet, P. E. Parent, Henri Melancon, W. L. Andrew and M. Cailloux, as assistants.

Owing to the difficulty of obtaining a sufficient number of engravers to keep the field work up to date very good advance sheets could be prepared for printing if the draughting room staff were increased by a couple of really good draughtsmen. The present staff is barely able to keep up with the ordinary routine and advantage cannot properly be taken of photo-lithography.

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During the past year the engraving has been handled by the same engraving staff as last year, but many charts are held for want of a sufficiently large staff.

During the fiscal year ten new charts (10) and forty-eight (48) new editions of old charts were issued to the public, and 10,000 charts were sold, the demand for these consistently increasing.

With the end of this fiscal year I have again to express my appreciation of the good work that has been carried out by the members of the staff, almost without exception, and in this connection I would like to point out that no improvement has taken place in the remuneration paid and this is entirely disproportionate to the amount and value of the work done.

Almost every officer is at the top of his class, and whilst the work is becoming more important and more valuable every year, few of the staff are receiving just reward for their services, and under these conditions, as long as human nature is as it is, officers cannot be expected to overexert themselves in any work assigned to them. All men like to find their efforts appreciated and with the small salaries paid, even to the seniors, the most appreciated recompense would be advancement and increase of pay. In corroboration of this it might be pointed out that in March two of the officers, Messrs. Parker and Lewis, the former of whom had thirteen years' service to his credit, resigned to take up better positions and better remuneration. The resignation of men of such experience from the staff is a distinct loss to the service, because hydrographic surveyors cannot be picked up. There is no other school for training them than this Survey and long years of experience have taught the undersigned that proficiency cannot be obtained unless with many years' training. Almost all the officers who have joined this staff did so with a view to earning a livelihood and most of them have given the best that was in them to this service and they rightly consider that the reward has not been commensurate with the service they have rendered.

MONTHLY Mean Water Surface Elevations of the "Great Lakes", by Automatic Water Gauges, during 1923

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet
Lake Superior.....	601.67	601.40	601.30	601.29	601.53	601.71	601.94	602.00	602.06	601.98	601.92	601.72	601.71
Port Arthur.....													
Michipicoten H.....	601.71	601.56	601.38	601.32	601.51	601.60	601.77	601.91	601.98	601.95	601.90	601.71	601.69
Above Lock.....	601.24	601.12	600.85	600.81	601.11	601.25	601.47	601.63	601.63	601.67	601.53	601.46	601.31
St. Mary's River.....													
Below Lock.....	580.43	580.64	581.09	581.35	580.60	580.64	580.69	580.57	580.53	580.23	580.01	579.77	580.55
Georgian Bay.....	578.70	578.82	578.82	579.06	579.46	579.73	579.74	579.67	579.53	579.33	579.02	578.83	579.23
Lake Huron.....	578.93	578.85	578.86	579.06	579.52	579.82	579.82	579.74	579.62	579.41	579.11	578.89	579.30
Goderich.....	573.43	573.07	573.38	573.85	574.27	574.47	574.60	574.35	574.20	573.90	573.56	573.58	573.89
Isle aux Peche.....	573.06	572.42	572.81	573.21	573.59	573.78	573.95	573.67	573.51	573.16	572.87	572.92	573.25
Fighting Island.....													
Port Colborne.....	570.85	570.62	570.85	571.20	571.60	571.90	571.81	571.58	571.32	571.06	570.88	571.22	571.24
Lake Erie.....													
From 21st day.....				245.48	245.65	245.95	245.84	245.43	245.09	244.66	244.37	244.49	245.14
Lake Ontario.....	244.74	244.56	244.87	245.46	245.75	246.02	245.89	245.46	245.16	244.72	244.46	244.60	244.90
Toronto "A".....													
Kingston.....	244.38	244.35	244.64	245.21	245.50	245.81	245.65	245.30	244.91	244.49	244.24	244.37	244.90

"A"—Records taken by Toronto Harbour Commission.
Elevations are above mean sea-level and are referred to the United States Lake Survey datum of 1903 adjustment.

MONTHLY Mean Water Surface Elevation of the "St. Lawrence River", by Automatic Water Gauges, During 1923

Gauge Locations	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean
	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet
St. Lawrence.....	243.50	243.50	243.72	244.38	244.67	244.97	244.77	244.50	244.11	243.74	243.51	243.68	244.09
	242.17	241.83	241.85	242.87	243.28	243.63	243.43	243.16	242.78	242.39	242.14	242.24	242.65
	225.86	227.31	227.45	227.60	227.70	228.15	227.86	227.47	226.84	226.26	225.91	226.14	227.05
	222.92	224.95	225.14	224.50	224.41	224.84	224.60	224.29	223.75	223.24	222.90	223.07	224.05
	212.34	219.22	219.39	214.46	212.58	212.98	212.69	212.33	211.90	211.43	211.13	211.32	213.48
Lake St. Francis.....	199.59	198.30	198.55	199.97	200.08	200.32	200.07	199.81	199.73	199.47	199.22	199.38	199.54
	161.40	159.70	157.82	155.60	152.95	153.13	152.90	152.65	152.38	152.03	151.89	152.13	154.55
	151.84	151.56	151.41	152.33	151.94	152.09	151.87	151.66	151.41	151.10	150.95	151.18	151.61
	151.24	150.95	150.69	151.60	151.47	151.59	151.33	151.12	150.85	150.61	150.51	150.77	151.06
	133.72	133.62	133.13	134.27	134.18	134.34	134.02	133.77	133.46	133.16	133.01	133.32	133.67
St. Lawrence River.....	95.31	95.12	94.86	95.63	95.39	95.55	95.37	95.30	95.05	94.83	94.80	94.92	95.18
	69.65	72.75	73.47	72.18	71.33	69.90	68.59	67.98	67.75	67.26	67.17	67.72	69.65
	69.93	70.66	70.87	72.53	76.20	73.42	71.52	70.60	70.77	70.30	70.43	71.13	71.51
	67.97	67.67	66.95	69.05	71.02	69.50	68.24	67.60	67.36	66.89	66.84	67.42	68.05
	66.61	66.19	65.51	67.93	70.07	68.60	67.14	66.47	66.22	65.69	65.70	66.28	66.87
St. Lawrence River.....	From 5th day	From 8th day	From 1st day	.....	25.89	22.58	20.36	19.32	91.19	18.56	18.60	till 19th.	till 19th.
	From 11th day	From 1st day	From 9th day	.....	24.74	21.27	19.06	18.06	17.94	17.32	17.40	till 18th.	till 18th.
	From 1st day	From 1st day	From 1st day	.....	23.59	19.82	17.49	16.45	16.36	15.78	15.91	till 17th.	till 17th.
	From 14.55	From 14.55	From 14.97	.....	20.71	16.88	14.58	13.64	13.57	.....	.....	till 30th.	till 30th.
	From 11th day	From 11th day	From 11th day	19.16	20.34	16.41	14.23	13.34	13.25	12.77	12.97	13.98	15.11
Lake St. Peter.....	From 1st day	From 1st day	From 1st day	.....	19.42	15.49	13.17	12.19	12.11x	11.75	12.18	till 16th.	till 16th.
	From 2nd day	From 2nd day	From 2nd day	.....	18.44	14.23	11.90	10.95	10.93	.....	.....	till 18th.	till 18th.
	From 6th day	From 6th day	From 6th day	.....	14.78	11.24	9.33	8.65	8.57	.....	.....	till 25th.	till 25th.
	From 4th day	From 4th day	From 4th day	.....	11.60	8.77	7.09	6.46	6.39	6.22	6.67	till 15th.	till 15th.
	From 4th day	From 4th day	From 4th day	.....	4.71	3.32	2.42	2.16	2.15	1.98	2.36	till 15th.	till 15th.

NOTE.—Prescott to Cornwall, inclusive—Elevations are above mean sea-level and are referred to the United States Lake Survey datum of 1903 adjustment.
Summertown to Neuville, inclusive—Elevations are above mean sea-level and are referred to the Department of Public Works precise levels.

TIDAL SURVEY

REPORT OF DR. W. BELL DAWSON, F.R.S.C., SUPERINTENDENT, TIDAL AND
CURRENT SURVEY

SURVEY OF TIDES AND CURRENTS

This survey has been carried on with success during the past year, and considerable headway has been made especially in completing and reducing observations which have been under way for some years; and also, in devising new methods of calculation which will apply to the St. Lawrence above Quebec and to the tide tables for Quebec itself. This should be an important benefit to navigation. The principal tidal stations both in Eastern Canada and on the Pacific coast have been maintained throughout the year. One of the stations in Eastern Canada became flooded in the autumn; but by special attention, it was possible to maintain the observations throughout the winter. On the Pacific coast, the work was completed on the main line of the ocean steamships through Boundary pass and Haro strait on the route from Vancouver to the ocean; and further observations of the current were obtained in Baynes channel near to Victoria. This region has been under survey for some years, and final results have now been worked out. The principal work in Eastern Canada was the expedition to Hamilton inlet, by which extended information regarding the tides and currents in that region were obtained. There has also been published during the year a special report entitled "Tide Levels and Datum Planes on the Pacific Coast of Canada." This is based upon all tide levels obtained from the outset on the Pacific coast, including the datum planes used in the various cities. It should be specially valuable to engineers, in affording data for construction purposes; and to other surveys which require a low-water datum or mean sea-level for their purposes.

THE CURRENTS OF THE PACIFIC OCEAN

Observations of the turn of the current in Boundary pass have now been carried on for four seasons, as well as one winter at the two crucial points in this region. These are, East point of Saturna island and Turn point, at both of which vessels have to make a sharp turn at a right angle. The reductions of the observations has proved unusually difficult, but a general explanation was afforded by the observations in Rosario strait, as explained in last year's report.

At East point, definite relations were obtained between the turn of the current and the tide at Sand Heads. These relations furnish the basis for the calculation of the time of slack water at East point, which is now published in the Tide Tables. For the turn of the current at Turn point, extended investigation was carried out. The time of slack water was compared with various tidal stations, and an analysis was made in one of the lunar periods. The results showed in all cases a considerable variation; and it was found that no advantage was obtained by distinguishing the large and half tides. The best practical result that could be obtained for high-water slack was a difference of time with Sand Heads, although this difference varies by twenty-two minutes earlier or later than the average. The time of low-water slack is more definite, and it is practically simultaneous with low water as given in the tide tables for Sand Heads.

In Baynes channel, which lies between Chatham island and Ten-mile point east of Victoria, the current presents peculiar features. At Victoria, the tide may rise or fall continuously during two successive tidal periods; and at such times there is only one high water and one low water in the day. It is never-

theless possible for the current in Baynes channel to turn four times in the twenty-four hours. It may thus turn when there is no tide in the Victoria tide tables with which to make comparison; but if it does turn at such times, its strength is not great or the run of long duration. A definite relation with the tides which do occur at Victoria has been arrived at; that is, with the actual tides given in the tide tables. This will be of much service to navigation in this region.

In the lower Fraser river the freshet continued so late in the season of 1922 that the current seldom turned. Good observations were obtained, however, during last season toward the autumn. In reducing these observations they were combined with the results obtained with a steamer in the channel-way, which runs through the delta as far as Sand Heads, in the season of 1919. A difference of time by which slack water may be found with reference to the tide tables, has been deduced from these observations and will hereafter be published. The behaviour of the current is also explained in a way that will be serviceable to vessels navigating the lower Fraser. Further up the river at New Westminster, the incoming tide is unable to reverse the river current except in the autumn months when the river is at its lowest level. The investigation of these currents was made under the supervision of Mr. S. C. Hayden, who also carried out the inspection of the tidal stations on the Pacific coast.

It was desired by the United States Coast and Geodetic Survey to make a further investigation regarding the current in Seymour narrows. For this purpose we were asked to establish two tide gauges as near to the north and south ends of the narrows as practicable. These gauges were placed in Quathiaski cove in Discovery passage, and at Knox bay south of Chatham point. The hourly height of the tide as obtained simultaneously at these two localities, was forwarded to the Coast and Geodetic Survey as a basis for harmonic analysis, by which it may be possible to compute the turn of the current in Seymour narrows.

The observations obtained at Quathiaski cove have enabled the tidal data to be revised for the whole length of Discovery passage, from Cape Mudge to Nymphs cove in Seymour narrows. The change in the time of the tide amounts to more than an hour in this distance, but the revision has been carefully made. This will be of distinct benefit to the local traffic, especially to Campbell river.

OBSERVATIONS IN EASTERN CANADA

The observations of the current in the strait of Canso, which were taken in 1922, were not continued last season, as the staff was engaged elsewhere. The superintendent took the opportunity to investigate the conditions along the St. John river as far up as Fredericton. In such tidal rivers, the current is often modified by islands and cross channels, in such a way that the flood and ebb streams are deflected and disturbed. A series of points along the river were found, however, at which the current in both directions can be observed with advantage at the same locality. Because of the demand for tidal data for the St. John river, observations taken in 1908, 1912 and 1913 were worked up. The results were also compared with investigations made by Prof. A. W. Duff in 1896. From this material, correct data for the tide along the river have been deduced. This is much appreciated, especially by the lumber industry. The information for the St. John river was issued in advance of publication in the tide tables, in the month of April; and we were informed by one of the leading lumber firms that they appreciated this very much, as it came to them just at a moment when it was of great importance to them.

The Public Works Department desired information at St. Stephen, N.B., in connection with dredging operations contemplated there in the following season. A tide gauge was accordingly erected there in the autumn for a period

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of three months, from which the data desired were obtained. This gauge and two others in the Anticosti region, were installed by Mr. R. B. Lee.

At Amherst harbour in the Magdalen islands, a tide gauge was placed for reference during a hydrographic survey of the region. The tide is very slight there, except at the springs and a record of the behaviour of a tide of this character is therefore interesting, as it is at a central point in the gulf of St. Lawrence.

LABRADOR AND HUDSON BAY

In connection with the boundary question between Canada and Newfoundland, the Department of Justice desired information of a special character throughout Hamilton inlet. The character of observations which would bring to light the physical features bearing upon the case, were very carefully considered by the Superintendent of the Survey. To demonstrate the points involved, it was necessary to determine the temperature and salinity of the water in certain areas both at the surface and in deep water, and also to deal with the question of flow in the Rigolet narrows. Tidal observations were also desirable in some connections. The results need not be detailed at present, as the case is still in the hands of the Department of Justice; but a considerable amount of valuable information on the tides and currents was obtained during the course of the observations.

An expedition at short notice was organized; and Mr. H. W. Jones, of the Tidal Survey staff, was in charge of the party, which consisted of two assistants and two other helpers. The time for doing the work was also strictly limited, and it was therefore necessary quite frequently to carry on the observations day and night to obtain the results desired. The season proved an exceptionally bad one as regards both late ice conditions and weather, which made the work more strenuous than had been anticipated. Valuable data were, however, obtained for the region.

In regard to the tidal aspects of the region it had been already ascertained from somewhat fragmentary observations obtained during the chart survey, made by the Hydrographic Survey in 1922, that this part of the coast of Labrador can be referred with advantage to Halifax. A primary tidal station was therefore established at Indian harbour on the open coast off Hamilton inlet, as a reference station for the work further in. The earlier observations referred to, had been correlated with this harbour; and by obtaining continuous observations there, a good relation with Halifax was established. Continuous observations were also obtained at Rigolet; as well as at Ticoralak island immediately outside the narrows. Although a steamer was not available, a successful effort was made by the party to obtain observations of the current in the narrows with current meters, as well as to determine the time of slack water at Square Rock point, immediately above Rigolet.

By means of these observations, tidal data for the whole of the Hamilton inlet region have been secured; as well as the strength of the current in the narrows under various tidal conditions, and the time at which slack water occurs when the current turns. This information will be valuable to navigation in the region, as the traffic to the inlet is considerable. It was also possible, with good observations at Indian harbour, and also at cape Chidley where observations were obtained during the Hudson Bay expedition of 1884, to determine approximate tidal data for intermediate points along the Labrador coast, which will be of value to the coasting trade.

Arrangements were made in 1921 with the Superintendent of Bay Transport of the Hudson's Bay Company, to place tide gauges at Amadjuak in Hudson strait, and at Port Harrison and Great Whale river which are two Hudson bay posts on the east side of the bay. So far, tidal record has been

received from one only of these localities, as mentioned in last year's report. It is hoped however, that further results will be obtained during the present year.

The tidal observations in James's bay were continued this season in co-operation with the Chief Engineer of the Timiskaming and Northern Ontario Railway. A good series of observations was thus obtained at Revillon at the mouth of Moose river for a period of nearly three months. For comparison with the tide on the open coast, a few days record was obtained at Ship Sands off the mouth of the Moose river. These results were secured without expense to this Survey, as the railway company benefits by the data obtained for the design of harbour works.

TIDAL OBSERVATIONS ON THE PACIFIC COAST

For some years past, the investigation of the currents has been the chief work carried out on the Pacific coast; and during last season only two tide gauges were erected by this Survey to the north and south of Seymour narrows, as already explained. Tidal information at several localities has been secured, however, through co-operation with the Hydrographic Survey on this coast. The localities in question were Queen Charlotte in Skidegate inlet on the Queen Charlotte islands and Turtish harbour on Aristazabal island on the east side of Hecate strait, where continuous observations for two months or more were obtained. Observations for one month were also secured at Waiatt bay on Okisollo channel close to the important pass named Hole-in-the-Wall, which is at the heart of the net-work of passages opposite the northern end of Vancouver island. This proves to be one of the most northern points at which the tide still corresponds in type with the strait of Georgia. Observations were also continued last season at Ocean Falls, an important manufacturing locality. Such observations serve the immediate purpose of the Hydrographic Survey, while at the same time they extend the knowledge of the tides to new points on the coast. This has its importance, because new localities which spring up on the coast can never be very far from a point at which tidal information has been obtained; and any such locality can thus know at once the tidal conditions for the region in which it is situated.

IMPROVEMENT IN THE TIDE TABLES

The tide tables in future will benefit by the publication of the results obtained from the observations already explained. The separate publication of tide tables for Hudson bay has been discontinued and the whole of the information now available is given in the Tide Tables for the Eastern Coasts of Canada. This is an improvement as the leading ports are referred to tide tables in that edition. The information has been rearranged to a considerable extent; all estuary tides, apart from the main information for the St. Lawrence, are grouped together, and with this the St. John river is included.

The data by which the height of the tide at cap à la Roche can be found in accordance with the method described in last year's report, are now published in the tide tables. This enables the available draught at cap à la Roche to be deduced from the river level at Sorel by means of a correlation which has been turned to practical account. The method has now been put into use, by which the time of the tide at Quebec can be calculated with greater accuracy from the predictions for Father Point. To test the method, the time of the tide in a past year was calculated by it, and the result compared with the time as actually observed at Quebec. It was thus made evident that a distinct increase in accuracy is obtained by the new method.

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On the Pacific coast, an improvement in the method of calculating slack water in Porlier pass has been devised. This is one of the passes between the Gulf islands in the strait of Georgia through which coal is towed from the Nanaimo mines to Vancouver. In this region, the calculation of the time of slack at low water is more complex than at high water. In Active pass, it is necessary to classify the low-water slacks in three groups according to the moon's position, in making the calculations. Until now, slack water in Porlier pass has been calculated independently; but it was discovered that a constant difference was obtained between the times of low-water slack in the two passes, which was independent of the classification indicated. It was thus possible to compute low-water slack in Porlier pass by means of a difference applied to the calculated time in Active pass. By this method, the advantage of the classification in Active pass itself is carried on for the benefit of Porlier pass, which affords a distinct improvement in accuracy. The time of slack water in these passes is of vital importance to water transportation, as heavy towing is impracticable while the current is running strongly. Very considerable loss used to occur through delays, before the time of slack water was calculated and published; and any improvement in the accuracy of the predictions is thus of direct advantage to industry. In publishing the new information on the currents for the Pacific coast, a rearrangement in the tide tables has been made which puts it in a more convenient form for reference.

INFORMATION SUPPLIED

A number of letters are received which request information regarding tides and currents. To some of these replies can be made by sending publications; but in other cases explanations, or even some special work is required to meet the requirements when information on tide levels, or in regard to a suitable low-water datum, is asked for. This has been supplied for a considerable number of localities, chiefly for the benefit of other surveys or for engineers of the Public Works Department. The results deduced from observations of the tide, obtained in co-operation with the Hydrographic Survey, have been worked out promptly and supplied to that Survey.

The Ordnance Survey of Great Britain with headquarters at Southampton, is making an investigation of the variation of mean sea-level in the North Atlantic; and several countries are requested to afford data for this purpose. The records obtained at the tidal stations on the eastern coasts of Canada are particularly valuable in this connection, because of the long series of observations now available. For the purpose in view, the value of mean sea-level in successive months is required; and although this Survey could not offer to reduce the observations to a monthly series, the following data have been supplied: The height of the tide at each hour during a series of ten and a half complete years at St. Paul island in Cabot strait, from 1912 onwards; a series of five complete years at St. John, N.B., in the bay of Fundy; and four years of recent observations at Halifax from 1919 onwards. This information comprises the tabulation of the tide curves in hourly ordinates during a total of nearly twenty years. A part of this had already been done and photostat copies could be made; but a considerable part of the work was new, and an arrangement for special assistance in carrying it out had to be made. The work will be of value to this Survey as well, as it can be used as a basis for further harmonic analysis to improve the accuracy of the tide tables.

A similar request was received from the United States Coast and Geodetic Survey, for the height of the tide, hour by hour, at Vancouver during a period of two and a half years. This is desired as a basis for determination of mean sea-level for comparison with other determinations made by the Coast Survey

on their Pacific coast. This has been put in hand, but is not yet completed. Another request from the Tidal Division of the United States Coast Survey, was for information on the Bore at the head of the bay of Fundy. The material sent in reply included tracings of curves which show the time of the arrival of the Bore at Moncton, and extracts from publications.

Two schemes for the development of power from the tide, in the region of the bay of Fundy, are being investigated by engineers; one of them at the mouth of the Petitcodiac river and the other in Passamaquoddy bay. The primary data for such investigations are the curves showing the rate of rise and fall of the tide, and the greatest and least ranges which it can have. The tidal observations in the bay of Fundy which have already been secured by this Survey, are thus proving of special value in this connection; as they are continuous day and night, and in the upper part of the bay considerable trouble was taken to obtain a tide curve which fell to extreme low water, beyond the existing wharves.

There is a difference of time between the transit of the moon and the first high water following, which enables the time of the tide to be found approximately by captains of vessels who are strangers, and not provided with tide tables. The value required for the purpose is known as the Establishment, and this is usually published on marine charts as a first indication, where tide tables are not at hand. During the year, this Establishment has been computed from our tidal records with relation to the concurrent astronomical data, for five localities in the Miramichi region and four localities in the approach to the bay of Fundy, between cape Sable and St. John, N.B.

The above instances will indicate the way in which this Survey is able to co-operate with others in tidal matters. A considerable amount of correspondence has been carried on with the International Hydrographic Bureau at Monaco, and the Tidal Institute at Liverpool; chiefly regarding methods of calculation. All new information on tides and currents which is obtained by the Survey, is sent promptly to the Hydrographer of the Navy in London for publication in the British Tide Tables, and in the Sailing Directions issued by the British Admiralty. This gives it wide publicity and it is an advantage to navigators on their first voyage to Canada.

PUBLICATIONS

A special publication was prepared and issued during the year entitled, "Tide Levels and Datum Planes on the Pacific Coast of Canada." It comprises the data obtained regarding tide levels and extreme tides at a number of localities on the Pacific coast. A series of values for mean sea-levels is given for successive years, at each of the permanent tidal stations. The low-water datum is also definitely recorded with reference to local bench-marks at numerous points along the coast, including localities at which it was determined during the early Admiralty surveys for marine charts. The datum used in the cities and leading harbours of British Columbia, has been correlated with the tide levels, so that all former datums used during the last thirty or forty years are brought into harmony with the tidal investigations, and the levels which they have established. The results given in this publication are of value to engineers for construction purposes, as well as to other surveys. They have already been utilized by the Geological Survey as a basis for their contoured maps, and by the Geodetic Survey of Canada for precise levelling. In several regions, the level of high water is given which defines the boundary of properties with a sea frontage; the correct level of the tide for the purpose being adopted with the concurrence of the provincial authorities. This brief outline may serve to indicate the numerous uses for which tide levels are required.

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The two main editions of the Tide Tables for the Eastern Coasts of Canada and the Pacific coast have been prepared and issued as usual; as well as the three abridged editions for the St. Lawrence, the Bay of Fundy and the Strait of Georgia. The preparation of these abridged editions effects a considerable saving in the cost of printing, because they serve instead of the complete tide tables for the wide circulation amongst fishermen and others who depend on motor boats for transportation. Because of the desire for economy at the present time, the circulation of the tide tables during the last three years was carefully investigated; and it was found possible to reduce the number printed by 4,500 copies in all, distributed amongst the various editions. This brings the total output to 60,000 copies. It was not possible to reduce the number without serious detriment to those to whom tide tables are essential, in some one of the many ways in which tide tables are used.

RADIOTELEGRAPH SERVICE

REPORT OF C. P. EDWARDS, O.B.E., F.I.R.E., A.M.E.I.C., DIRECTOR

GENERAL INFORMATION

Administration of Radio

The activities of the Radio Branch comprise in the main:—

- (1) Administration of the Radiotelegraph Act and Regulations issued thereunder;
- (2) Construction and operation of radio stations.

The administration of radio throughout the Dominion, as presented in the Radiotelegraph Act, chapter 43, Statutes 1913, comprises:—

- (a) The licensing of all classes of radio stations in Canada, including those on ships of Canadian registry, and on aircraft;
- (b) The inspection of such stations to ascertain that they are equipped and operated in accordance with the Radiotelegraph Act and Regulations and with the provisions of their respective licenses;
- (c) The examination for Certificate of Proficiency in Radio, of the operating staffs of such stations;
- (d) The inspection of all ships, Canadian and foreign, leaving Canadian ports, fitted with radio, to ensure their compliance with the Radiotelegraph Act so far as it affects them, more particularly that section which prescribes that certain passenger ships must be equipped with an efficient transmitting and receiving equipment.

Construction and Operation of Government Stations

East Coast and Great Lakes, thirty-five stations.—The East Coast and Great Lakes system consists of thirty-five stations, forming a chain extending from Port Arthur to the Atlantic ocean. All these stations are owned by the department, twenty-two of them are operated by the Marconi Company under a contract whereby they receive a subsidy of \$5,500 per annum per station and retain all the tolls collected, with the exception of a small percentage which accrues to the department from the eight stations on the Great Lakes and one station on the East coast. This contract expires in 1931.

The thirteen remaining stations are operated directly by the department as aids to navigation, six Direction Finding stations, four beacon stations, two lightships, and one emergency station in the Halifax Dockyard.

West Coast, fifteen stations.—On the Pacific coast the department operates a chain of nine stations extending from Vancouver (Point Grey) to Prince Rupert (Digby island), including a Direction Finding station at Pachena. This chain gives service to ships at sea and in addition provides the only means of communication with the Queen Charlotte islands. Incidentally service is also provided for eleven private commercial stations installed by the owners of lumber camps, canneries, paper-mills, etc., on the British Columbia coast.

Radiotelephone stations have been established at Carmanah, B.C., Pachena Point, B.C., Cape Beale, B.C., and Banfield, B.C., and temporary spark transmitters at Tofino, B.C., and Lennard Island, B.C., in connection with the Life-saving Service.

Hudson Bay, two stations.—The two stations installed at Port Nelson and LePas in 1914 were closed down when construction on the Hudson Bay railroad ceased in 1918. They have been out of commission since that date.

Direction Finding Stations

The department's policy of installing Direction Finding stations as "aids to navigation" is continuing to prove of great value to navigators. In addition to the four Direction Finding stations which have been in operation on the East coast for the past five years, three additional stations were erected during the year and placed in commission at St. Paul's Island, N.S., on September 24, 1923; Yarmouth, N.S., on January 5, 1924, and Pachena Point on November 8, 1923, respectively, all these stations being built and directly operated by the department. Further extensions to this service, contemplating the conversion of one or two of the existing coast stations into Direction Finding stations, are under consideration.

Radio Beacon Stations

An experimental Radio Beacon station was installed at Cape Ray, Nfld., and went into commission on August 27, 1923. The satisfactory results obtained therefrom resulted in additional Beacon stations being installed on the Lurcher Lightship, the Anticosti Lightship and at Seal Island, N.S. Next year it is proposed to erect a Beacon station at Cape Bauld, at the north end of the Belle Isle straits.

The apparatus used in these Beacon stations was specially designed and built by the department and is so arranged that when the ordinary sound fog-alarm machinery is started up, the radio alarm signal automatically operates and continues until the plant is shut down. These stations have a range of approximately fifty miles and ships fitted with direction finding apparatus take their bearings therefrom.

Aids to Navigation

An important function of the Coast Station Service is the organized broadcast transmissions for the benefit of ships. Under this organization six stations on the East coast and gulf of St. Lawrence, seven on the Great Lakes and three on the West Coast, broadcast, twice daily, at advertised hours, a message containing weather forecasts, position and nature of any danger to navigation, such as ice, derelicts, etc., in that area, and any changes in aids to navigation. The actual messages are compiled at the different division offices which act as the bureaus for the collection and dissemination of this information. In addition, in the case of forecasts of hurricanes or other specially urgent matters, messages notifying same are immediately broadcast from the stations without waiting for the regular broadcast period.

No charge is made for any "aid to navigation" service, and ships desiring information regarding the weather, ice or kindred matters, can obtain same by asking for it. This service is used to fullest advantage by shipping.

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In addition to the above, a complete system of reporting passing ships is in effect on both the East and West coasts, and the information is available at the division offices for the public, press and shipping interests.

Ice Patrol in Cabot Straits

At the opening of navigation in the gulf of St. Lawrence, special additional service is given to shipping in these waters. An ice-breaker maintains a patrol between St. Paul's island, Heath point and cape Ray, locates the ice, ascertains the best route to be followed, and renders assistance to any vessels requiring the same.

The efficiency of this service is largely dependent on radio, and every effort is made to make it first class; three experienced operators are detailed to the ship and the apparatus completely overhauled.

This year the patrol was undertaken by the C.G.S. *Montcalm* from April 15 to May 28.

Under the general organization the ship acts as the controlling station for the area. A message containing the latest information in regard to ice conditions from cape Race to Quebec is compiled and broadcast by the ship every four hours, the information being collected from the different radio and signal stations in the gulf and on the river St. Lawrence, incoming and outgoing ships, etc.

This service works in co-operation with the International Ice Patrol off cape Race and vessels approaching the gulf have available every four hours, or immediately if they ask for it the very latest information.

or immediately if they ask for it, the very latest information in regard to ice conditions and the best route to be followed.

The total volume of traffic handled by the *Montcalm* during the period this year was as follows:—

Class of Traffic	Number of Messages	Number of Words
Sent.....	386	17,477
Received.....	716	15,612
Broadcast.....	83	11,966
Total.....	1,185	45,055

Radiotelephone Broadcasting

The popularity of broadcasting continues unabated, and the department which is charged with the administration and control of radio under the Radio Act of 1913, is fully appreciative of its responsibilities in the matter. There were at March 31, 1924, forty-six Broadcasting stations in the Dominion and approximately six hundred in the United States. The annual license fee for a transmitting station in Canada is \$50, and for a receiving set \$1. The number of receiving licenses sold during the year was 31,609. Next year it is estimated that the revenue from this source will amount to \$70,000. Receiving licenses are sold by inspectors, by staff post offices and by dealers, the latter receiving 10 per cent of the license fee for such service.

Under the amendment to the Radio Act, passed last session, a portion of the license fees collected may be paid to the broadcasting stations. This is so far only being done in the case of the station CKY; operated by the Manitoba Government, in Winnipeg. They receive 50 per cent of the revenue collected in Manitoba, their proportion for the nine months it was in effect last year amounting to \$574.50.

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The Dominion Government on representations from the province of Manitoba, has agreed to issue no licenses for broadcasting stations in that province, except with the concurrence of the provincial administration. This arrangement is tentative.

Control and protection of broadcasting involves constant and adequate inspection and the cost of maintaining a permanent inspector in every town being prohibitive, the department is, for the present, using "part time" inspectors, with, I am glad to report, considerable success. These inspectors listen in on the air at nighttime, check up any interference present and take steps to remedy the same. The inspection staff consists of seven permanent and twenty-seven "part time" men, and the total cost of the inspection service, including cost of issuing licenses, was \$27,500 during the year.

With a view to helping broadcast conditions inter-departmental arrangements were made with the United States, to clear the broadcast band of waves from interference from United States and Canadian ships and coast stations. The Canadian Government has also made representations to the Imperial Government with a view to similar action being taken in respect of British ships plying to Canadian and United States ports.

The department is replacing the old type interfering spark apparatus at the stations at Quebec, Montreal, Toronto, Vancouver, Victoria, and Prince Rupert, with new type continuous wave equipment, and is generally taking all possible steps to eliminate all controllable interference with broadcasting by other stations.

A grant of \$3,000 has been made to the Research Council to conduct an investigation into noises caused by power lines, etc., with a view to seeing what can be done to reduce interference emanating from this source.

International Convention

Canada subscribes to the International Radio Convention, which controls the international working of radio. One function of the Radio Branch is to see that all Canadian stations are operated in accordance with the regulations of this Convention, and another to act as intermediary in the settlement of all international radiotelegraph accounts of Canadian ships and stations.

Imperial Chain of High Power Stations

The deadlock between the commercial radio interests and the Imperial Government in regard to the establishment of an imperial chain of high power radio stations to link together the Mother Country and the Dominions is now nearing a satisfactory conclusion.

The question was fully discussed at the Imperial Economic Conference, London, 1923, Canada's representative being the Hon. Geo. P. Graham, and as a result the following resolution was adopted:—

"(a) That this Imperial Economic Conference affirms the importance of establishing as quickly as possible an efficient Imperial Service of Wireless Communication, and is of opinion that the several Governments of the Empire should take immediate action to remove any difficulties which are now delaying the accomplishment of this, while providing adequate safeguards against the subordination of public to private interests."

Acting on this resolution the British Government formed the Imperial Wireless Telegraph Committee under the chairmanship of Robert Donald, and in the committee's report, which was presented on February 22, 1924, the following recommendations of interest to Canada were made:—

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Empire Radio Services

(1) That the state through the Post Office should own all wireless stations in Great Britain for communication with the overseas dominions, colonies, protectorates and territories.

(2) That the Post Office should operate directly, under an improved business organization, all the Empire stations in Great Britain.

(3) That as an alternative an exception be made to the foregoing recommendations in the case of Canada, for the reasons stated in paragraphs 48 to 51, and that competition between the Post Office and private enterprise in the Anglo-Canadian wireless service, which exists at present, be continued, provided that, in any license granted for the Anglo-Canadian service, public interests are safe-guarded as regards conditions of working and terms of expropriation by the state.

The committee also recommended that private enterprises be given facilities to develop wireless communication with the rest of the world outside of the British Empire, subject, in certain cases, to suitable terms being arranged for the payment of royalties or otherwise in view of the competition which would exist between wireless and state-owned cables.

The British Government, however, did not see its way to accept the recommendation that an exception be made in the case of the Canada transatlantic service, as suggested in recommendation No. 3, and they announce that the English terminal station of this circuit must be state-owned. The Canadian Marconi Company on receipt of this information immediately made urgent representations to the Dominion Government that their arrangements for financing the new Vancouver and Montreal stations were dependent on the fact that the company's station in Canada was to work with their affiliated company's station in England and that it was very doubtful if they would be able to proceed with the establishment of the Montreal and Vancouver stations if this arrangement were interfered with. These representations were forwarded to the British Government by this department and negotiations were entered into between the British Post Office and the English Marconi Company and as a result a compromise has been arrived at, which it is understood is satisfactory to the affiliated Marconi companies and the British Government.

The high-power station in England which is now in course of erection at Rugby will be state-owned and operated and the English Marconi Company has been given the contract to erect a Short Wave Beam station for the British Post Office for communication with a similar station to be erected by the Canadian Marconi Company under license in the vicinity of Montreal. The cost of these short wave stations is estimated at approximately \$300,000 each.

The Canadian station will be operated by the Canadian Marconi Company and the English station by the British Post Office, the latter paying the English Marconi Company a percentage of the gross revenue earned by the station in respect of patent royalties. The public announcement in regard to the latter arrangement was made on July 23, 1924.

STATIONS IN OPERATION

The total number of stations in operation in the Dominion and on ships registered therein is on March 31, 1924, as follows:—

Coast stations.....	34
Government Land stations.....	1
Direction Finding stations.....	7
Beacon stations.....	4
Life-saving stations.....	5
Government Ship Stations.....	28
Licensed Ship Stations.....	232
Licensed Limited Coast stations.....	2
Licensed Public Commercial stations.....	7
Licensed Private Commercial stations.....	55
Licensed Private Commercial Broadcasting stations.....	46
Licensed Amateur Broadcasting stations.....	22
Licensed Radiotelegraph Training Schools.....	14
Licensed Experimental Stations.....	46
Licensed Amateur Experimental Stations.....	1,345
Licensed Private Receiving stations.....	31,609
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	33,457

(For further details, see “Official List of Radio Stations in Canada.”)

RADIO REGULATIONS

Fees for licenses effective March 31, 1924. The annual fees to be paid in respect of Radio Licenses and Certificates issued by the Minister of Marine and Fisheries are as follows:—

1. Limited Coast station.....	\$50 00
2. Public Commercial station.....	50 00
3. Private Commercial Broadcasting station.....	50 00
4. Private Commercial station.....	10 00
5. Experimental station.....	5 00
6. Amateur Broadcasting station.....	10 00
7. Amateur Experimental station.....	2 50
8. Private Receiving station.....	1 00
9. Technical or Training School station.....	5 00
10. Ship station.....	10 00

FEES FOR EXAMINATIONS

1. Extra First-Class Certificate.....	\$5 00
2. First-Class Certificate.....	2 50
3. Second-Class Certificate.....	1 00
4. Third-Class Certificate.....	1 00
5. Experimental Certificate.....	2 50
6. Amateur Certificate.....	0 50
7. Emergency Certificate, any Class.....	5 00
8. Radiotelephone Certificate.....	2 50

WAVELENGTHS

The following special wavelengths for Experimental and Amateur Experimental stations are now in effect.

Amateur Experimental Stations.—Amateur Experimental stations will, until further notice be allowed to transmit on the following wavelengths:—

- Pure C.W.—All waves in the band 125 to 150 metres, 175 metres.
All waves in the band 200 to 225 metres.
- Spark.—175 metres only.
- Radiophone and I.C.W.—Limited to the wavelengths of 150, 175 and 200 metres.

Experimental Stations.—Experimental stations will be allowed to transmit on all the above wavelengths and in addition on 275 metres for special experimental work.

INSPECTIONS

The administration of the Radiotelegraph Act has been carried on as usual and no evasions or attempted evasions of section 4 of the Act, calling for compulsory equipment of radiotelegraph apparatus on board certain steamers have been reported.

Permanent inspectors are maintained at Victoria, Toronto, Ottawa, Halifax, Montreal (summer) and St. John (winter). These inspectors, in addition to inspecting all ships and licensed stations in their district, also undertake the examination of operators for Certificates of Proficiency. All land stations are inspected at least once a year and all ships when they visit Canadian ports. An increasing large amount of extra work has been thrown on the inspection staff due to broadcasting.

The department's policy in making use of qualified amateurs as "part time" inspectors to police the ether is proving very satisfactory. These "part time" inspectors located at different points throughout the Dominion are paid a nominal salary of \$10 or \$15 per month. "Part time" inspectors have been appointed at the following places:—

Prince Edward Island.—Charlottetown, Summerside.

Nova Scotia.—North Sydney.

New Brunswick.—St. John.

Quebec.—Montreal, Quebec, Sherbrooke, Three Rivers.

Ontario.—Brantford, Fort William-Port Arthur, Hamilton, Kingston, Kitchener, London, Peterboro, Sarnia, Toronto (2), Windsor.

Manitoba.—Brandon, Winnipeg.

Saskatchewan.—Moosejaw, Regina, Saskatoon.

Alberta.—Calgary, Edmonton.

British Columbia.—Vancouver.

The number of inspections carried out during the fiscal year was:—

Coast and Land Stations.....	94
Ship Stations.....	2,049
Amateur Experimental Stations.....	2,330
Total.....	4,473

EXAMINATION FOR CERTIFICATE OF PROFICIENCY IN RADIO

Eighty-six examinations for Commercial Radio Certificates were held during the year.

Forty-eight candidates were successful and 38 failed; 184 candidates for Amateur Radio Certificates were also examined of whom 181 were successful and 3 failed. One thousand three hundred and twenty-eight Certificates of Proficiency in Radio have been issued by the department up to the end of March, 1924.

TRAFFIC AND TRAFFIC ACCOUNTING

The service comprises, the preparation, rendering and collection of accounts for commercial ship to shore and inter-station messages handled by the departmental stations. The auditing, rendering and collection of international accounts to various operating companies and foreign administrations for radiotelegrams exchanged by foreign ships through Canadian coast stations and by Canadian ships through foreign stations; also for radiotelegrams, exchanged by Canadian Government-owned or operated vessels via Canadian or foreign coast stations.

The number of traffic accounts handled by the branch amounted to approximately 110,000, representing \$155,000.

Traffic Handled.—The paid business handled via Canadian Coast stations during the fiscal year was as follows:—

	Paid business between Ships		Paid business between Stations	
	Messages	Words	Messages	Words
East Coast.....	54,138	779,913	14,663	391,057
Great Lakes.....	24,161	356,545	1,662	26,863
West Coast.....	22,864	428,079	80,435	1,740,079
Totals.....	101,163	1,564,537	96,760	2,157,999

Messages Handled by the Coast Station Services.—The total number of messages and words handled during the year ending March 31, 1924, were as follows:—

	Messages	Words
East Coast.....	142,251	2,523,369
Great Lakes.....	50,746	797,045
West Coast.....	179,467	3,364,136
Hudson Bay.....		
Total.....	372,464	6,684,550

The amount of business handled by the East Coast System (operated partly by the Canadian Marconi Company under contract and partly by the department) shows an increase from last year's business amounting to 14,973 messages, containing 100,213 words.

The Great Lakes System (operated directly by the Canadian Marconi Company under contract), shows an increase of 20,322 messages with an increase of 328,260 words.

The West Coast System (operated directly by the department) shows an increase of 25,437 messages containing an increase of 789,379 words.

REVENUE

The total amount of radio revenue accruing to the department during the year amounted to \$89,054.51, as against \$56,513.24 in 1922-23, an increase of \$32,541.27. This revenue is apportioned as follows:—

1923-1924	
<i>Traffic Revenue—</i>	
East Coast.....	\$ 2,165 65
Great Lakes.....	510 89
West Coast.....	48,334 62
	—————\$ 51,111 16
<i>Other Revenue—</i>	
License fees.....	\$ 37,659 35
Examination fees.....	284 00
	—————37,943 35
Total.....	\$ 89,054 51

The West Coast shows an increase of \$13,857.44; the Great Lakes an increase of \$389.23, and the East Coast a decrease of \$3,180.55, Net traffic revenue increase, \$11,066.12.

The license fees show an increase of \$21,436.15, and the examination fees an increase of \$39, or a total other revenue increase of \$21,475.15.

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DIRECTION FINDING STATIONS

Bearings were given to ships by the six stations on the East Coast and Pachena Point station on the West Coast during the fiscal year, as follows:—

Station.	Bearings
Chebucto Head, N.S.....	2,685
Canso, N.S.....	2,516
Yarmouth, N.S. (established January 5, 1924).....	642
St. Paul Island, N.S. (established September 24, 1923).....	558
Cape Race, Nfld.....	4,280
St. John, N.B.....	1,043
Pachena, Point, B.C. (established October 29, 1923).....	1,000
Total.....	12,724

PERSONNEL

The personnel of the Radiotelegraph Service during the past year was as follows:—

<i>Government Service—</i>	
Headquarters.....	24
Coast Stations.....	61
Land Stations.....	69
Ship Stations.....	13
	<hr/> 167
<i>Commercial—</i>	
Headquarters.....	220
Coast Stations.....	68
Land Stations.....	68
Ship Stations.....	197
	<hr/> 553
Total.....	<hr/> 720

NEW CONSTRUCTION, ADDITIONS AND ALTERATIONS

WEST COAST

The most important work undertaken during the year was the erection of a Direction Finding station at Pachena. This station was put into operation during September and has proven of very great value to shipping. The reports so far received from shipmasters indicate a high degree of efficiency both as to personnel and apparatus.

The installation of radiotelephone equipments for life-saving purposes was also in hand during the year and pending their completion temporary spark coil sets were installed. An efficient communication service was given between the outside West coast and the Life Saving station at Banfield.

The installation of continuous wave transmitters at Gonzales Hill, Estevan Point, Alert Bay and Digby Island was undertaken and two sets were in operation before the end of the year, at Gonzales and Digby.

The installation of these transmitters is in accordance with the policy of the department in replacing, as rapidly as possible, the obsolete type of spark transmitting apparatus originally installed thirteen to sixteen years ago at eight of the stations on the West coast now operated by this department.

The spark sets have reached the end of their useful life and require extensive replacements. The continuous wave transmitters are far more efficient and cause infinitely less interference than the spark transmitters. They are so designed as to be easily adaptable to radiotelephony by the addition of one minor instrument. This is an important feature as several private stations which connect with our chain of stations have expressed a desire to change their stations to radiotelephony. The four transmitters which have recently been purchased were made entirely in Canada by the Marconi Wireless Telegraph Company of Montreal. They have an input rating of 4 K.V.A.

The workshop staff have been kept busy throughout the year; many minor jobs were done in addition to the larger works mentioned.

Alert Bay.—The masts and rigging at Alert Bay were overhauled. A considerable amount of work was carried out to improve the water supply and sanitary arrangements. The old water tower was taken down and a new tower was built, 15 feet higher than the previous tower to improve the pressure at the dwelling-houses. Two flush toilets were installed in the bathroom of each dwelling-house. A septic tank and new drains were installed and all the water piping and drains were overhauled and repaired.

A new water-cooling tank has been fitted in the engine room.

The tramway track has been repaired and put into good order.

Other minor repairs were made to the dwelling-house.

Bull Harbour.—Two new plunger pumps were made up in the workshop for circulating the cooling water for the engines. These pumps were to replace the rotary pumps previously used which were found to be unsatisfactory. The new pumps have given every satisfaction.

Cape Lazo.—Temporary repairs were made to the roofs and windows which were damaged during a heavy storm. An estimate covering the cost of labour and material required to put the buildings in good order has been submitted. The material has been purchased and is now on the site.

Digby Island.—On January 8 last, a portion of the quarantine wharf collapsed during a heavy gale, thus severing the telegraph cable to Prince Rupert. Upon inspection the cable was found to be beyond repair as it was so badly disintegrated that it would not stand lifting for repairs. Temporary wireless communication was established with Prince Rupert by installing a small valve equipment in the Post Office building at Prince Rupert. A new six-core lead covered submarine cable has been ordered and is now under construction at the factory. It will be installed in the next fiscal year.

Alterations were carried out to the operating house to provide for the installation of the 4 K.V.A. continuous wave set. This set has been installed and is ready for operation.

The interior of the operating house has been painted and put in good condition.

Other minor repairs were carried out to plank walks and platforms.

Estevan Point.—Owing to the danger of fire to the roof and surrounding wooded land in dry weather from red-hot carbon discharged from the vertical exhaust stack of the semi-diesel engine, it was arranged to have the exhaust run horizontally. This was accomplished by cutting a channel in the cement floor and laying the pipe therein. The pipe was carried well past the outside wall of the building.

A small machine shop has been fitted up in one end of the power-house.

A line of shafting driven by a 2-horsepower D.C. motor has been erected and a lathe drill press and emery grinder has been installed. A supply of small bench tools has been provided and the station is now in a position to carry out minor repair work.

The fuel tanks have been painted and connected up.

A hot-water heating system for heating the power-house has been installed.

A small coal-burning water still has been installed for distilling water for batteries.

An I-beam travelling chain hoist has been installed above the Type 1 generators for lifting the armatures.

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The well has been cased in with planking and all exposed water pipes have been boxed in and others buried below frost level.

The bunkhouse has been sheathed in and painted.

Grading has been done by the station staff and wire fencing has been erected around some of the buildings.

The old four-piece mast which was becoming dangerous has been taken down and a new three-piece 200-foot fir mast has been erected in its place. All the rigging and aerals have been overhauled.

A lot of repair work has been carried out on the tramway track.

A considerable amount of testing of the transmitting and receiving circuits has been carried out.

A new condenser was installed on the Type 1 set.

New brush holders have been made up for the two Type 1 generators. These have proved to be quite satisfactory.

Gonzales Hill.—The operating room has been rearranged and lined with panelling.

The new 4 K.V.A. continuous wave transmitter has been installed and is now operating satisfactorily.

A new 200-foot three-piece fir mast was erected and new aerals put up.

The buildings were painted outside.

A ground screen was erected to improve the existing earth in connection with the operation of the valve transmitter.

Pachena Point.—During the summer of 1923 it was decided to carry out a series of tests with the object of finding a suitable site for a Radio Direction Finding station on the West coast of Vancouver island. Test sites were accordingly started at Carmanah and Pachena and a series of test bearings were taken at each place.

It was found that Pachena was the most suitable from all points of view and an additional advantage was the existence there of buildings belonging to the old coast station which, with slight repairs could be utilized as a dwelling and power-house for the Direction Finding station.

In order to immediately give ships the benefit of this new Direction Finding service a temporary operating house was built and the first bearings were given on November 8, 1923. Reports which have so far been received from masters of vessels are very encouraging and show that this station will be a very important aid in navigation.

Construction work is still in progress with the repairs to the old buildings and erection of two new dwellings and a permanent operating house. A 240 ampere-hour Lead Type Emergency Battery has been purchased and will be installed at this station.

Point Grey.—A direction finding aerial has been erected and a Goniometer fitted to assist the operators in cutting out interference when necessary.

The transmitting sets have been overhauled and switches fitted to enable a change of wavelengths.

The water-cooling tanks have been removed and the water mains connected to the engines for cooling.

The interior of the operating room has been painted and minor repairs made to the operating tables, etc. Repairs and alterations were made to the dwelling-house. One inside partition was torn down and the stove and water boiler were placed in the back room. A new chimney was built to enable the stovepipe from the kitchen stove to go direct to this chimney without passing through wooden partitions. The living-room and dining-room were panelled and the interior of the house painted.

Life Saving Stations.—The installation of radiotelephone equipments for the life saving service was placed in hand during the year. These are to provide for communication in case of emergency between the lighthouses at Carmanah, Pachena Point, Cape Beale and the Life Saving station at Bamfield Creek, all on the southern part of the West coast of Vancouver island.

These equipments are of the Type R3-A, manufactured by the Northern Electric Company, Montreal. Pending the completion of these installations, spark coil transmitters were installed as a temporary means of communication, until the telephone sets were in commission and the lightkeepers instructed in their operation. The latter have proved their ability to work the sets with success.

Temporary spark coil transmitters have also been installed at Lennard Island and the Life Saving station at Tofino, and will be in operation until permanent arrangements are made for a cable or radiotelephone.

EAST COAST

Chebucto Head, N.S., D.F.—No new construction work was carried out at this station during the year. The standing rigging was found to be in good condition. The batteries have been overhauled and new separators installed throughout and arrangements are being made to overhaul the engine and replace the crankshaft.

Canso, N.S., D.F.—The standing rigging gear was overhauled and a new topmast band fitted. The jurymast and mainmast were painted and sewerage system overhauled. Work in connection with the outside painting of station buildings has been started.

Cape Race, Nfld., D.F.—The standing rigging was overhauled and a new aerial made up and erected. This new type of aerial wire, No. 42 20, cadmium copper, has proved very successful, as, despite numerous storms, no aerial trouble was experienced during the past winter.

St. John, N.B., D.F.—A new bungalow was built for the accommodation of the senior married operator. The dwelling of the officer in charge was overhauled and repairs carried out. The rigging was overhauled, the mast painted and new irons put on the jurymast. On installation of new direction finding receiver changes were made in the areials, one point of suspension for each aerial loop to jurymast made instead of two suspension points as before, thereby using only one weight on each loop. The station was recalibrated and a change over arranged to use either type of direction finding receiver.

St. Paul Island, N.S., D.F.—To fill a much needed want the department decided to establish a Direction Finding station on St. Paul Island, in the gulf of St. Lawrence. Suitable sites on the island are limited but after a careful survey a test station was erected on the north shore of Atlantic Cove. This station has been giving bearings to ships since September 24, 1923, the date of going into commission. The utility of a Direction Finding station at this location was at once apparent as approximately 200 bearings were given to vessels during the month of November; reports received testify to the accuracy of the bearings given. Further tests carried out by our engineers have justified the selection of the site on Atlantic Cove as the location for the erection of the permanent station. It is proposed during the coming summer to erect a powerhouse and dwelling. This station during the closed season of navigation in the gulf of St. Lawrence is open for communication during limited hours, the staff being correspondingly reduced. The inhabitants of the island are provided with a means of communication to the mainland in the event of an interruption to the existing cable circuit.

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Yarmouth, N.S., D.F.—On account of the prevalence of fog and strong tidal currents, mariners have always experienced great difficulty in ascertaining their position when navigating the southwest coast of Nova Scotia in the vicinity of cape Sable and the Lurcher lightship. The department decided to carry out tests in the vicinity of Yarmouth for the establishment of a Direction Finding station and a site was definitely decided upon a Rockville near Yarmouth and actual construction commenced in November, 1923. The station was placed in commission and gave bearings to vessels on January 5, 1924. This station is taken full advantage of by vessels plying to bay of Fundy ports, and fishing trawlers on the nearby banks. Masters of vessels in the Boston-Yarmouth service are enabled to make the entrance of Yarmouth harbour in the face of most adverse weather conditions. Landline telegraph connection has been installed with the wireless office in the Halifax Dockyard.

Cape Ray, Nfld., Radio Beacon.—The department in carrying out its decision to develop and experiment with the use of radio beacons established an experimental $\frac{1}{2}$ K.W. apparatus in the fog-alarm building at Cape Ray, Nfld. This apparatus, which was made up in the test room at Ottawa, was installed and placed in commission on August 27, 1923, and the results obtained from its operation are highly satisfactory. The beacon transmitter is operated by the fog-alarm attendant during foggy weather.

Anticosti Lightship Radio Beacon.—An automatic key for transmitting a beacon signal from the existing ship set on board was installed and placed in commission on September 18, 1923.

Lurcher Lightship Radio Beacon.—An automatic key for transmitting a beacon signal from the existing ship set on board was installed and placed in commission on January 7, 1924.

Seal Island, N.S., Radio Beacon.—A $\frac{1}{4}$ K.W. beacon apparatus was installed in the fog-alarm building at Seal Island and placed in commission on April 3, 1924. Similarly to Cape Ray, the beacon transmitter is operated by the fog-alarm attendant during foggy weather. This station has been found very useful to ships fitted with direction finding apparatus in rounding cape Sable.

IMPROVEMENTS

An important development during the year in connection with direction finding was the introduction of a new instrument equipped for "Sense Determination."

With the instruments originally supplied, the Direction Finding station gave the ship a bearing of 245 degrees, leaving to the master of the vessel to decide for himself, from his estimated position, which bearing was the correct one. With the new instrument, the above ambiguity is avoided, the ship being furnished directly with its bearing from the station.

Instruments equipped for "Sense Determination" have been carefully tested out and have now been installed at the Red Head (St. John), N.B., St. Paul's Island, N.S., Yarmouth, N.S., and Pachena, B.C., Direction Finding stations, where they are giving excellent results.

Improvements designed by the Radio Branch have also been made in the masthead aerial supporting arrangement at the Direction Finding stations with a view to strengthening them to combat heavy gales and sleet storms; the same were tried out thoroughly during the past winter, and proved very satisfactory. All Direction Finding stations will be fitted with the new arrangement in due course.

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ASSISTANCE RENDERED TO SHIPS DURING THE YEAR BY GOVERNMENT
RADIO SERVICE

WEST COAST

Bull Harbour

SS. *Richmond*.—At 3.20 p.m. on September 29, 1923. The Standard Oil Company steamer *Richmond*, bound Port Alice, reported to the Bull Harbour station ashore in Quatsino sound. At 3.15 a.m. September 30 vessel refloated, reported damage in fore peak only and was able to proceed to Port Alice and thence Prince Rupert without assistance. No distress call was sent out by *Richmond*.

SS. *Redondo*.—At 5.10 a.m. on October 9, 1923, the ss. *Redondo*, bound from Seattle to Alaska, reported to the Bull Harbour station ashore at entrance to Llama passage. Damage to fore part of vessel, was able to get off and proceed on voyage without assistance.

SS. *Algerine*.—At 5.50 p.m. on October 13, 1923, the salvage steamer *Algerine*, bound for wreck of ss. *Kennecott*, on west coast of Queen Charlotte islands, went ashore on Brodie rock, Principe channel, inside Banks island. The *Algerine* sustained serious damage but was able to float off without assistance. Did not proceed on voyage as both engines were out of commission. Tugs *Nanoose* and *Hercules* were despatched from Vancouver to tow *Algerine* to Esquimalt.

SS. *Prince Rupert*.—At 1.05 a.m. on December 8, the ss. *Prince Rupert* reported to the Bull Harbour station ashore at Nealon point, Johnstone channel. The ss. *Princess Beatrice*, which was requested to stand by to render assistance if necessary, succeeded in pulling the *Prince Rupert* off at 12.30 p.m. same day. The *Rupert* reported no damage of any kind and continued on her voyage.

Digby Island

Tug *Cape Scott*.—At 10.30 a.m. on April 3, 1923, the tug *Cape Scott* reported to Digby Island that she was disabled with a broken tail shaft off Bonilla island and needed a tow. At noon the *Newington* was despatched to assistance and brought the tug and her raft in tow to a safe anchorage on the following morning.

Motor Ship *Kennecott*.—At 12.50 a.m. on October 9 the Digby Island station received a distress message from the motor ship *Kennecott*, ashore on the north-west end of Queen Charlotte islands near Dixons entrance. The steamers *Queen*, *Latouche* and *Northwestern* were communicated with but were unable to proceed to the *Kennecott*. At 2 a.m. the U.S.C.G. *Unalga* left Sitka for the *Kennecott*. The steamers *Cordova* and *Surveyor* also went to assistance. The *Cordova* located the *Kennecott* on Hunters point, Graham island. Vessel a wreck; no lives loss.

SS. *Amur*.—On February 8, 1924, the ss. *Amur* went ashore on White Cliffe island. Vessel not equipped with wireless, report being brought to Digby Island by a gas boat. All vessels in vicinity equipped with W.T. were notified and requested to render any assistance possible. The *Amur* went ashore at high tide and was not refloated until the high tides of the following week.

Estevan Point

SS. *Lake Gebhart*.—At 3.30 a.m. on May 9, 1923, the Estevan station received a distress message from the ss. *Lake Gebhart*, ashore on rocks south of Umatilla light. At 3.37 a.m. the Tatoosh station was in communication with

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the *Lake Gebhart*. Tatoosh being the nearest coast station, Estevan stood by in case of need. The ss. *Snohomish* and tug *Humaconna* arrived at scene of wreck at 1 p.m. and 10.30 p.m. respectively. An effort was made to pull the *Gebhart* off without success. At 7 a.m. on May 10 the *Algerine* arrived and reported unable effect salvage and returned to Victoria. It was later reported that the *Gebhart* had sunk.

SS. *Claremont*.—At 4 p.m. on October 16, 1923, the North Head station broadcasted a distress message advising ss. *Claremont*, abeam Columbia river lightvessel with boiler trouble and steering gear out of order. The Estevan station assisted by broadcasting the S.O.S. and position of *Claremont*. Later reports intercepted by Estevan to effect that *Claremont* under way proceeding San Francisco; no casualties.

Tug *Dolly C*, Tug *Equator*.—At 2 a.m. on October 10, 1923, the Estevan station received and broadcasted a distress message from the tug *Dolly C* ashore on bar at mouth of Quillayate river. The *Snohomish* and *Tuscarora* were advised but could not assist as only vessels of shallow draught could get over the bar. At 2.30 a.m. the *Dolly C* advised launch standing by and at 2.50 a.m. that no assistance required, tug anchored in midstream. The *Dolly C* had gone to the assistance of tug *Equator* and mishap occurred after crew had been taken off the latter vessel. *Equator* a total loss.

SS. *Stanley Dollar*.—At 8.56 p.m. on October 9, 1923, the Estevan station received a distress message from the ss. *Stanley Dollar* on fire in Lat. 37.30 N. Long. 135.15 W. The San Francisco and Eureka California coast stations were in touch with the *Dollar*, also several steamers in vicinity. Estevan at request of the Eureka station which was troubled with interference broadcasted the S.O.S. The ss. *Burford* gave distance about 100 miles from the distressed vessel and the ss. *Lacrescenta* as 160 miles. The *Dollar* declined immediate assistance, stating fire under control. Ship later advised fire under control and proceeded San Francisco. No casualties reported.

SS. *Shinkokumaru*.—At 10.30 p.m. on November 1, 1923, the Estevan station received a distress message from the ss. *Shinkokumaru* in Lat. 51.47 N. Long. 162.46 W, vessel helpless with broken tail shaft. The ss. *Algonquin* went to her assistance and on November 3 reported she had the *Shinkokumaru* in tow and making for seaward. On November 5 the *Algonquin* had to drop the *Shinkokumaru* when her towing bitts broke. Vessel afterwards towed in by tug *Humaconna*.

SS. *Author*.—At 11.40 p.m. on December 24, 1923, the ss. *Author* sent out a distress call, giving position Lat. 47.5 N. 124.5 W. As the *Author* was in vicinity of the North Head station, Estevan stood by. Later the *Author* directed all communications to Estevan as on account of the ship rolling badly and instruments moving out of place also noise of gale made it difficult to hear the American stations. At 9 a.m. on December 25, the weather moderated and ship was advised that tugs were on the way to assistance. The *Author* was later picked up by the tug *Sea Monarch* and towed to port. The *Author* was also assisted by the Pachena Direction Finding station. Pachena took and forwarded several bearings.

SS. *Tatjana*.—At 3.20 a.m. on February 27, 1924, the Pachena Direction Finding station advised Estevan a vessel signing Call Letters TTC (query) was calling. Estevan called vessel without response. At 3.49 a.m. a call was picked up from the TTR ss. *Tatjana* and an effort made to clear business through excessive interference. Parts of the message to effect "Struck", "Leaking

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badly " were copied and a request was immediately broadcasted for all ships and stations to standby. The *Tatjana* later advised that immediate assistance not necessary as apparently no immediate danger. At 5.50 a.m. the ss. *Snohomish* advised ready to go to assistance. The Tofino Life-boat and C.G.S. *Estevan* were also advised of wreck. The *Armentiers* proceeded to Barclay sound to assist. The *Tatjana* did not carry an operator and the wireless set was operated by one of the officers, until it went out of commission.

SS. *Columbia*.—At 10 a.m. on February 17, 1924, the *Estevan* station stood by for the ss. *Columbia*, who had reported in trouble at Coos bay, struck jetty and in danger of breaking up. The Empire Oregon Coast station rendered necessary attention to *Columbia*.

Gonzales Hill

U.S.S. *Henderson*, U.S.S. *Zeilin*.—At 7.30 a.m. on August 28, 1923, the U.S.S. *Henderson* collided with the U.S. destroyer *Zeilin* in vicinity of Port Townsend. The American naval authorities handled the situation, which apparently did not warrant Gonzales Hill advising the Pacific Salvage Company of the accident.

SS. *Siberian Prince*.—At 1.45 a.m. on August 29, 1923, the ss. *Siberian Prince* called "C.Q." ashore on Bentinck island. At 2.20 a.m. the Pacific Salvage Company took charge of the situation.

SS. *Handasan Maru*, SS. *Rainier*.—At 3.43 a.m. on August 28, 1923, the ss. *Mandasan Maru* reported colliding with the ss. *Rainier* 5 miles south southwest of Race Rocks. At 7.08 a.m. the Pacific Salvage Company were notified of collision and immediately despatched the *Algerin*, which was successful in locating the *Ranier* in a waterlogged condition and towed her to Esquimalt.

Point Grey

SS. *Camosun*.—At 12.30 a.m. on November 16, 1923, the ss. *Camosun* inward bound went ashore near the First narrows during a thick fog. Constant communication was maintained and particulars reported to the manager of the Union Steamship Company. The *Camosun* subsequently floated about 10 a.m. and proceeded to port without assistance. No apparent damage was reported.

SS. *Princess Adelaide*.—At 5.30 a.m. on November 18, 1923, the ss. *Princess Adelaide* inward bound struck on the sand seven miles east of Sandheads during a thick fog. Constant communication was maintained and progress intermittently reported to Captain Neroutsos of the C.P.R. The ss. *Princess Maquinna* being in the vicinity stood by until advised by Captain Neroutsos to continue voyage. The *Adelaide* floated during the morning and proceeded to Port without assistance. No apparent damage was reported.

EAST COAST AND GREAT LAKES

SS. *Imperoyal*.—At 3.25 a.m. on June 15, 1923, the ss. *Imperoyal*, bound from Montreal to Halifax, stranded on Grimes rock near Cranberry island, N.S. Shortly after vessel struck a message was despatched via the Sable Island station to the owners at Halifax, notifying them of accident. The Direction Finding station at Canso then inquired whether the C.G.S. *Arras*, which was then at Canso, could assist, whereupon the master of the *Imperoyal* requested that the *Arras* be sent out. Before the *Arras* reached the *Imperoyal*, however, the latter had succeeded in getting off the rock; nevertheless the *Arras* escorted the *Imperoyal* to Halifax, which port was reached at 11.40 p.m. the same day. The *Imperoyal* sustained some damage and was placed in drydock at Halifax.

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SS. *Mincio*.—At 2.30 a.m. on October 2, 1923, the Grindstone Island and Fame Point stations received a distress message from the ss. *Mincio* in Lat. 48.07 N. Long. 62.00 W., reporting steering gear damaged. Grindstone requested all stations to standby to permit of communication between the *Mincio* and *Comino*, which latter vessel was close at hand. Meantime Fame Point reported the matter to Marine Department and Superintendent Signal Service, Quebec. The *Mincio* was constantly in touch with the *Comino* and at 4.25 a.m. in answer to Fame Point's query as to whether that station could be of service in any way a negative reply was given. At 9.20 p.m. same date the *Mincio* advised Fame Point that temporary repairs had been effected to steering gear and that she was proceeding to Sydney, N.S. under own steam. The *Mincio* assisted by the ss. *Twickenham* reached Sydney on October 4.

SS. *Richelieu*.—At 3.23 a.m. the Quebec station received a distress message from the ss. *Richelieu*, aground at Lotbiniere in dense fog. Quebec made arrangements for tugs to proceed to assistance. At 7.25 a.m. the *Richelieu* reported that she had refloated and that the tug *Lord Strathcona* was standing by. Damage, if any, not reported.

SS. *Mapledawn*.—At 10.15 p.m. on June 1, 1923, the ss. *Mapledawn* reported to the Montreal station aground at Plum Island Vercheres. The vessel's owners and Signal Service were immediately notified. A tug was despatched and with its assistance the *Mapledawn* was released at 6.10 a.m. June 2. Damage, if any, not reported.

SS. *Canadian Adventurer*.—At 11.30 p.m. on May 23, 1923, the ss. *Canadian Adventurer* reported through the Point Edward station that she was aground on gravel bottom, St. Clair middle ground, St. Clair river; steering gear jammed but undamaged otherwise. A tug and lighter were ordered from Sarnia and ship was refloated on May 25, at 1 p.m.

SS. *Canadian Trader*.—At 8 a.m. on August 16, 1923, the ss. *Canadian Trader* went ashore at head of Russel isle, St. Clair river. Arrangements were made through the Point Edward station for despatch of a tug to assist and at 10 a.m. the *Trader* was refloated after having lightered part of cargo. It was reported that there was no apparent damage.

SS. *Berryton*.—At 7.25 p.m. on September 29, 1923, the ss. *Berryton* reported to the Point Edward station that she had been struck by the ss. *Bennington* in Detroit river opposite Detroit; the bow of the *Berryton* was said to be damaged. The Point Edward station forwarded a report immediately to Matthews Steamship Company, Toronto, and endeavoured to get details regarding the *Bennington* but failed as this vessel was not equipped with W T. The *Berryton* remained at anchor until extent of damage was ascertained and reports passed to owners. The *Berryton* afterwards proceeded to Port Arthur and effected repairs.

SS. *Devereaux*.—At 8.28 a.m. on October 7, 1923, the Point Edward station received a message from the ss. *J. A. Kling* to the effect that the ss. *Devereaux* was disabled off Bar point and required assistance. The information was conveyed to the addressee of the message and efforts were made by Point Edward to obtain further details but all that could be ascertained from the *J. A. Kling* was that it was thought to be engine trouble on the *Devereaux*. No further information was received but it was believed that the vessel subsequently proceeded on her voyage. The *Devereaux* was not equippld with W/T.

SS. *Calcite*.—At 9.30 a.m. on November 20, 1923, the following message was received at the Point Edward station from the ss. *Calcite*, "we are aground in ship's channel close to Huron lightship; please find out if water is low at

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Point Edward." The master was informed that report from Marine Reporters, Port Huron, states that water is down two feet there. It being ascertained that the *Calcite* was in no immediate danger and that there was room in the channel for other ships to pass, Point Edward broadcasted the following: "Steamer *Calcite* aground in ship's channel near Huron lightship; advise Captains when passing her." Messages to and from the *Calcite* were handled via Point Edward and Rogers City stations until vessel refloated at 3.30 p.m. same date. No damage was reported.

SS. *Home Smith*.—At 11 a.m. on December 4, 1923, the ss. *Home Smith* reported to the Point Edward Station aground on sand bottom at outside end inside piers in mid channel, Goderich harbour. Point Edward broadcasted notice to all ships bound Goderich. The *Home Smith* was released at 4.30 p.m. same date and proceeded to dock. No damage reported.

SS. *Maplecourt*.—At 4.35 a.m. on December 15, 1923, the ss. *Maplecourt* reported via the Point Edward station aground in mid channel, Goderich harbour, 300 feet from inner piers. After ascertaining that no immediate assistance was required of him Point Edward notified all vessels bound Goderich. With assistance of tug *Sarnia City* the *Maplecourt* was released at 1.30 p.m. December 16, and proceeded to dock. Extent of damage unknown.

SS. *Mapledawn*.—At 9.10 p.m. on December 17, 1923, the ss. *Mapledawn* reported to the Point Edward station, grounded while entering Goderich on south side of channel. Tug *Sarnia City* working to release us. As no other steamers were bound for Goderich no broadcast of this information was made. Point Edward gave immediate despatch to all messages exchanged between master and owners. Several futile attempts were made by tugs to pull vessel off. The *Mapledawn* was lightered and refloated at 2 a.m. on December 20, and proceeded to dock. No damage was reported.

SS. *Morrow*.—At 2.10 a.m. on May 15, 1923, the ss. *Morrow* reported to the Tobermory station that she was aground on southwest bank, Cove island. The vessel's owners were communicated with promptly and tugs *Harrison* and *Keenan* despatched to assist. The *Morrow* was released at 4.00 p.m. on May 16 and proceeded on voyage to Byng inlet.

SS. *Glenstriven*.—At 7.30 a.m. on November 16, 1923, the ss. *Glenstriven* grounded on southwest shoal, Cove island. The vessel was not equipped with W/T so messages were conveyed by boat to the Tobermory station and transmitted from there to the Midland station. The owners were notified and arrangements made for assistance. The *Glenstriven* was released by the Reid Towing and Wrecking Company on December 5th at 6.00 p.m. and taken to Collingwood for repairs. During salvaging operations special attention was given to the handling of traffic between Tobermory and Midland.

SS. *J. Frater Taylor*.—At 5.10 a.m. on July 19, 1923, the ss. *J. Frater Taylor* ran aground at the entrance of Little Rapids cut. Messages exchanged between the master and owners were transmitted via the Sault Ste. Marie station. At 7.30 a.m. same date the *Taylor* was refloated with assistance of tugs and with no apparent damage.

SS. *Cayuga*.—At 9.10 a.m. on July 29, 1923, the ss. *Cayuga* from Toronto to Lewiston, N.Y., grounded off the mouth of Niagara river in dense fog. No distress call was sent out but the master communicated via the Toronto station with his owners and also notified the master of the ss. *Chippewa* of the same

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line by W/T. The latter vessel proceeded to assistance and took off passengers after which the *Cayuga* was refloated at 11.50 a.m. same date and proceeded under her own steam to port of destination. All messages were handled expeditiously.

Car Ferry *Ontario No. 1*.—January 6-8, 1924, during a heavy gale the Car Ferry *Ontario No. 1* was driven from her course and forced to head into the storm from west. She proceeded in that direction for about 20 miles until shelter was found under mainland at Port Credit, Ont. A number of messages exchanged between the master and shore captain were handled via the Toronto station. Toronto also retransmitted a message from Car Ferry *Ontario No. 2* to Car Ferry *Ontario No. 1* advising that light on West pier at Cobourg burning dimly.

SS. *Luzon*.—At 8.40 p.m. on October 7, 1923, the ss. *Luzon* went ashore on the northeast of Passage island. This vessel was not equipped with W/T. At 11 a.m. on October 8 whilst the ss. *W. C. Franz* was passing Passage island a boat carrying the second mate of distressed ship was despatched from the passage lighthouse to the *Franz* and it was then learned that the *Luzon* was in bad shape and her master seriously ill. Messages were sent immediately by the master of the *Franz* via the Port Arthur station notifying the ship's interests of the situation, whereupon prompt steps were taken to render aid. The barge *Empire* handled lightering operations and as that vessel had W/T all interested parties were kept in touch with operations via the Port Arthur station. The *Luzon* was released on October 9 at 9 p.m. after 50,000 bushels of grain had been lightered.

SS. *Samuel Mather*.—At 1.15 p.m. on October 20, 1923, the ss. *Manitoba* reported by W/T to the Port Arthur station that the ss. *Samuel Mather* was ashore at Keweenaw point. Port Arthur immediately informed the Wolvin Vessel Agency (local representatives of the Interlake Line). The barge *Empire* was despatched to assistance on October 21. It is understood that the *Samuel Mather* was released by vessels of her own line and towed by them to Duluth for repairs. Extent of damage unknown. The *Mather* was not equipped with W/T.

GENERAL

SS. *G. R. Crowe*.—At 1.35 p.m. on August 24, 1923, the W/T operator of the ss. *G. R. Crowe* was instructed by his master to transmit the following distress call: "S.O.S. *G. R. Crowe* wants assistance at once, Lat. 22.58 N., Long. 93.09 W." The call was repeated continuously until 2.45 p.m. when the ss. *Olma* replied that she was 42 miles north and proceeding to assistance. A few minutes later the *Olma* corrected her position to that of 20 miles south of position given by *G. R. Crowe*. At 5 p.m. the *Olma* reached the distressed ship and about midnight took her in tow. At 3 p.m. on August 25 the *Olma* was compelled to relinquish her tow and broadcasted the following by W/T: "SS. *G. R. Crowe*, position 23.16 N. 93.35 W., requires assistance; she has carried away all our towing gear so we cannot render further aid." This message was answered by the U.S.S. *Pennsylvania*, which vessel was then 34 miles southwest and reported that she would reach the *G. R. Crowe* in three hours. At about 6 p.m. the *Pennsylvania* arrived on the scene and stood by until daylight August 26, when she took the *G. R. Crowe* in tow and arrived at Galveston at midnight August 28.

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SS. *Kyosei Maru*.—At 6.30 p.m. on January 4, 1924, the ss. *Kyosei Maru* sent out S.O.S. sinking and want immediate assistance, Lat. 49.40 N., Long. 147E. This call was picked up by the ss. *Empress of Russia*, who shortly afterwards put about and proceeded in direction of position given. At 4.17 p.m. the *Empress of Russia* communicated with the ss. *Harold Dollar* and advised that vessel of the plight of the *Kyosei Maru*. At 4.50 p.m. the *Harold Dollar* informed the *Russia* she was going to assistance, whereupon the latter vessel resumed her regular course. At 5 p.m. the *Harold Dollar* advised *Empress of Russia* that her deckload had shifted and steering gear jammed, could not proceed. At 5.45 p.m. the *Kyosei Maru* advised *Empress of Russia* that she required assistance and latter replied making all possible speed. At 4.10 a.m. January 5 communication was established between the *Empress of Russia* and ss. *President McKinley*. After the latter vessel had verified position of *Kyosei Maru* by means of her D.F. apparatus, and it was ascertained that the *Russia* had insufficient coal supply to continue search the *President McKinley* proceeded to distressed vessel. At 11.10 p.m. the *President McKinley* broadcast information having sighted *Kyosei Maru* and would stand by to take off all hands. At 6.35 a.m. on January 6 entire crew were taken off ship which was in sinking condition. Information was broadcast that *Kyosei Maru* was floating in Lat. 49.25 N., Long. 178.41 E., and was dangerous to navigation.

DIRECTION FINDING STATIONS

SS. *Advance*.—At 19.19 G.M.T. on July 2, 1923, the Chebucto Head D.F. station intercepted a distress message from the ss. *Advance*, ashore Shut-in island, rush assistance. W/T bearing 50° was being transmitted by Chebucto to the ship when she struck. W/T bearing given the *Advance* at 11.37 G.M.T. was 206°; no bearings were taken between 11.37 and 14.15 G.M.T., during which time ship covered an arc of 148°, Sambro to Shut-in-island. The Halifax wireless officer was immediately notified. Passengers and crew landed safely at Halifax. Ship broke in two, total wreck.

SS. *River Wye*.—At 11.10 G.M.T. on November 24, 1923, the Chebucto Head D.F. station received a distress message from the ss. *River Wye*, bound Boston, advising ashore Cape Sable, ship breaking up, require immediate assistance. Chebucto gave bearing at 11.56 G.M.T. 240½ degrees. This did not put vessel on cape Sable, but about half way between Chebucto and cape Sable. Ship not sure of position. Steamers *Natirar*, *Ripple* and *Lady Laurier* advise vessel ashore Port Mouton island, which apparently confirms bearing given. The Halifax dockyard was kept fully advised; later ship broken in two, total loss. Crew landed safely.

SS. *Carlsholm*.—At 16.50 G.M.T. on January 1, 1924, the ss. *Carlsholm* advised the Chebucto Head station, ashore Sable island. Will try to come clear of banks. Chebucto was unable to obtain bearing owing to interference; ss. *Slyvia* standing by. The Halifax wireless officer was advised. At 17.25 G.M.T. bearing 102½° approx. At 17.30 G.M.T. the *Carlsholm* refloated. No damage.

SS. *Cymric Queen*.—At 21.00 on April 26, 1923, the Canso D.F. station received a distress message from the ss. *Cymric Queen*, bound Louisburg from Barrow in Furness, advising ashore in packed ice in Lat. 45.35½ N., Long. 60.35½ W.; in no immediate danger but have asked Sydney for assistance. No bearing was requested until after vessel went ashore. Bearing given 43° correct. Triplicate bearings offered but *Cymric Queen* stated not necessary. Vessel refloated on May 20. The tug *Marshall* sent to her assistance ran aground at cape Hogan and became total loss, crew saved. The Halifax wireless officer was kept fully advised of proceedings.

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SS. *Jan*.—At 13.50 on May 16, 1923, the Canso D.F. station intercepted the following from the Grindstone Island station: "Danish steamer *Jan* ashore Northumberland straits, Southpoint, P.E.I.; leaking badly, requires immediate assistance. No bearing given this vessel prior to or after going ashore. Halifax wireless officer advised.

SS. *Obernai*.—At 07.08 on March 8, 1924, the Canso D.F. station intercepted a distress message broadcasted by the Galantry Coast station, St. Pierre, to the effect that ss. *Obernai*, position 46.45 N., 58.34 W., leaking badly in stokehold. Bearings were given *Obernai* by Canso D.F. $53\frac{3}{4}^{\circ}$, and St. Paul Island D.F. $109\frac{1}{2}^{\circ}$. The *Kungsholm* proceeding to assistance was given several bearings by Chebucto Head, Canso and St. Paul Island D.F. stations. Master of *Kungsholm* advised, bearings given of great assistance. Crew of *Obernai* took to boats and were later picked up by the *Kungsholm*.

SS. *Marvale*.—At 19.25 on May 21, 1923, the Cape Race D.F. station received a distress message from the ss. *Marvale*, bound from Montreal to British ports. No bearings were requested by the *Marvale*. Halifax wireless officer advised.

SS. *Oaknudson*.—On June 30, 1923, the ss. *Oaknudson* went ashore on Gull point, St. Marys bay, Nfld. Cape Race D.F. had no communication with this vessel and no bearings were given.

SS. *Troutpool*.—At 00.10 on October 1, 1923, the Cape Race D.F. station intercepted a distress message advising ss. *Troutpool* ashore west side St. Pierre island. No bearings were given. Halifax wireless officer advised. The *Troutpool* broken in two; total wreck, no loss of life.

SS. *A'Uroch*.—At 00.45 on October 2, 1923, the ss. *A'Uroch* stranded 3 miles from St. Pierre. All crew landed. No bearings given by Cape Race D.F. Halifax wireless officer advised.

Cruiser *Carvall Hoarijo*.—At 12.20 p.m. local time on August 31, 1923, the Portuguese cruiser *Carvall Hoarijo* ran ashore 30 miles south of St. John's, Nfld. Cape Race D.F. had no communication with this vessel and gave no bearings. Halifax wireless officer advised.

SS. *Pluto*.—At 6 a.m. on May 17, 1923, the ss. *Pluto* ran ashore on Quaco ledge. No distress call sent out. Vessel refloated later and proceeded to St. John, N.B. The St. John D.F. station handled messages exchanged between the *Pluto* and owners. No bearings given between 00.15 and 06.00 G.M.T. when accident occurred. The marine agent and Halifax wireless officer were advised.

C.G.S. *Aberdeen*.—At 17.03 G.M.T. on October 13, 1923, the St. John D.F. station received a distress message from the C.G.S. *Aberdeen*, ashore on Black ledge, sea island. The call was answered immediately, and all concerned notified. Accurate bearings were given to C.G.S. *Laurentian* while proceeding with C.G.S. *Arleux* to assistance.

BOARD OF STEAMBOAT INSPECTION

REPORT OF CHAIRMAN, FRANK McDONNELL

STAFF

Mr. Bert Mantrop, Steamship Inspector at Victoria, B.C., was transferred to the port of Toronto, Ont. Mr. J. T. Mathews was transferred from Edmonton to Vancouver.

Approval has been given to the establishment of an additional position as Steamship Inspector at the port of Montreal, the inspector to act in the dual capacity.

LEGISLATION

Two important changes were made in Part VII of the Canada Shipping Act concerning the inspection of steamships. By chapter 35, an Act assented to on June 30, 1923, sections 5 and 6, provision was made for

- (a) the acceptance, in the case of passenger ships, of certificates of inspection issued by the Government of Great Britain or by the Government of a British possession.
- (b) the acceptance, in the case of sea-going cargo ships, of survey by an exclusive surveyor to an approved classification society when made at any port or place outside Canada other than on the Great Lakes and connecting waters, or any other port or place specified by the Governor in Council.

In the above amendments power is given to the Governor in Council, in the case of (a), to direct that Part VII of the Act or certain parts thereof shall or shall not apply, and, in the case of (b), to make regulations governing the acceptance of a survey as described.

BOARD MEETINGS

The usual board meetings to deal with questions arising out of the administration of the steamship inspection service were held during the fiscal year.

Board meetings were also held to examine the qualifications of candidates for the positions of steamship inspector at the ports of Montreal and Kingston.

ENGINEER EXAMINATIONS

During the fiscal year 309 candidates for certificates of competency were granted certificates as marine engineers. In addition 76 temporary engineer certificates were issued.

Appended will be found a list of the Steamboat Inspection staff during the fiscal year, also table showing the number of inspections made, fees collected, etc.

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STEAMBOAT Inspection Staff for the Dominion of Canada During the Fiscal Year
Ended March 31, 1924.

SENIOR STEAMSHIP INSPECTORS

Name of Inspector	Headquarters	Division
N. A. Currie.....	Halifax, N.S.....	Nova Scotia
P. W. Lyon.....	Toronto, Ont.....	Western Ontario, Toronto and Collingwood.
H. G. Robinson.....	Vancouver, B.C.....	British Columbia

INSPECTORS ACTING IN DUAL CAPACITY

C. E. Dalton.....	St. John, N.B.....	New Brunswick and Prince Edward Id.
J. A. Samson.....	Quebec, Que.....	Quebec
J. E. Lunan.....	Montreal, Que.....	Montreal
J. B. Stewart.....	Toronto, Ont.....	Western Ontario, Toronto
W. L. Mackenzie.....	Toronto, Ont.....	" Toronto
R. C. Blyth.....	Collingwood, Ont.....	" Collingwood
W. J. Vigars.....	Port Arthur, Ont.....	" Port Arthur
*J. T. Matthews.....	Edmonton, Alta.....	Saskatchewan, Alberta and N.W.T.
A. Farrow.....	Vancouver, B.C.....	British Columbia
T. McC. Stephen.....	Vancouver, B.C.....	British Columbia
W. J. Cullum.....	Victoria, B.C.....	British Columbia
†B. Mantrop.....	Victoria, B.C.....	British Columbia

INSPECTORS OF BOILERS AND MACHINERY

D. J. Murray.....	Halifax, N.S.....	Nova Scotia
F. X. Hamelin.....	Sorel, Que.....	Sorel
J. T. Gardham.....	Montreal, Que.....	Montreal

INSPECTORS OF HULLS AND EQUIPMENT

A. McDougall.....	Halifax, N.S.....	Nova Scotia
D. K. O'Brien.....	Halifax, N.S.....	Nova Scotia.
Capt. W. R. Bennett.....	St. John, N.B.....	New Brunswick and Prince Edward Id.
P. Duclos.....	Quebec, Que.....	Quebec
M. R. Davis.....	Kingston, Ont.....	Kingston
S. D. Andrews.....	Collingwood, Ont.....	Western Ontario, Collingwood

INSPECTORS OF SHIPS' TACKLE

A. McDougall.....	Halifax, N.S.....
J. M. Martin.....	St. John, N.B.....
A. Duval.....	Montreal, Que.....

* Mr. Matthews was transferred to the port of Vancouver in October, 1923.

* Mr. Mantrop was transferred to the port of Toronto in December, 1923.

TABLE Showing the Number of Inspections Made, Fees Collected, etc., during the Year Ending March 31, 1924.

Division	Number of Inspections made, with Gross Tonnage of Vessels Inspected		Number of Vessels not inspected, with Gross Tonnage		Total Number of Vessels subject to Inspection when in Commission, with Gross Tonnage		Number of Vessels added to the Dominion, with Gross Tonnage		Number of Vessels lost, broken up, or destroyed, with Gross Tonnage		Fees collected by Inspector(s)	
	Vessels Registered or owned in the Dominion		Vessels Registered or owned elsewhere		No.	Gross Tonnage	No.	Gross Tonnage	No.	Gross Tonnage	On account of Inspections	On account of Examinations of Engineers
	No.	Gross Tonnage	No.	Gross Tonnage								
Halifax, N.S.....	170	142 434	13	32 035	208	185,977	1	1,097	5	875	\$ 15,642 00	\$ 219 00
St. John, N.B.....	91	62,269	2	4,108	172	185,972	.....	.....	2	719	5,500 00	56 00
Quebec, P.Q.....	60	33,196	1	348	86	34,994	7	8,431	.....	.....	4,800 00	87 00
Sorel, Que.....	102	72,863	1	150	131	85,203	2	391	.....	.....	6,260 00	91 00
Montreal, Que.....	183	311,162	3	2,990	304	371,364	6	2,293	8	5,055	18,737 60	453 00
Kingston, Ont.....	45	48,719	6	8,849	94	82,722	2	35	.....	.....	5,743 00	.....
Toronto, Ont.....	280	180,511	30	4,257	354	223,248	5	5,828	9	9,171	23,772 50	240 00
Collingwood, Ont.....	104	66,472	20	3,527	126	74,156	2	1,760	1	20	6,755 00	81 00
Port Arthur, Ont.....	68	22,751	85	5,583	155	31,074	2	625	4	386	3,370 00	36 00
Vancouver, B.C.....	253	162,696	39	22,032	305	301,407	18	2,498	8	956	20,999 55	359 00
Victoria, B.C.....	107	69,604	22	534	154	185,935	5	4,570	3	668	8,220 00	214 00
Totals.....	1,463	1,172,677	112	326,333	2,089	1,762,052	50	27,528	49	24,499	119,799 65	1,836 00

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APPROPRIATION AND EXPENDITURE

The parliamentary appropriation for the Marine Department for the fiscal year 1923-24 was \$7,051,424.61; the expenditure \$6,424,251.18; leaving an unexpended balance for the department of \$627,173.43.

CORRESPONDENCE

The number of letters received during the fiscal year 1923-24 was 118,424, as against 116,631 in 1922-23, an increase of 1,793.

The number of letters sent out during the fiscal year 1923-24 was 33,000; this does not include 8,000 circular letters dispatched.

The above statements do not include letters received and sent out by new branches transferred from Naval Service, or Fisheries Branch, a portion of these letters pass through the Central Registry.

NEW LEGISLATION

During the parliamentary session of 1923 new legislation affecting the department was enacted as follows:—

14-15 George V, Chapter 72.—An Act to provide for further advances to the Vancouver Harbour Commissioners; assented to July 19, 1924.

14-15 George V, Chapter 58.—An Act to amend the Montreal Harbour Commissioners Act, 1894; assented to July 19, 1924.

14-15 George V, Chapter 49.—An Act to amend the Inland Water Freight Rates Act, 1923; assented to July 19, 1924.

14-15 George V, Chapter 11.—An Act to amend the Canada Shipping Act, section 953; assented to July 19, 1924.

14-15 George V, Chapter 12.—An Act to amend the Canada Shipping Act, to give effect to certain Draft Conventions adopted by the International Labour Conference of the League of Nations; assented to July 19, 1924.

14-15 George V, Chapter I.—An Act for granting to His Majesty certain sums of money for the public service of the financial year ending March 31, 1925; assented to April 4, 1924.

A. JOHNSTON,

Deputy Minister of Marine and Fisheries.

